COAL AGE

Established 1911—McGraw-Hill Publishing Company, Inc.

DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

SYDNEY A. HALE, *Editor*

February, 1939

Pertinent and Impertinent

• MOST New Year's resolutions might just as well never have been written. Something really worth while in this line, however, is offered by the National Coal Association. That organization is asking its members to join in its market-promotion campaign to increase bituminous output 100,000,000 tons in 1939. The goal is neither fanciful nor fantastic if the industry will realize that price umbrellas always are full of holes and that competition can be licked only by volume production at low cost.

• HOW MANY executives of the 2,650 bituminous mines producing 10,000 tons or more per annum would question a salesman's expense account for ten dollars on a prospect he failed to land? Probably very few—particularly if only one such item appeared in a year's sales effort. Indeed, most companies would consider the sum too trifling for executive attention. But try to sign up those companies for a contribution of one mill per ton —$10 per 10,000 tons—for research! Yet such a sum would carry on a research program now fallen by the wayside for lack of funds.

• NEWSPAPER STORIES last month carried the report—source unrevealed—that the United Mine Workers would demand a 20 per cent increase in pay in the new Appalachian wage agreement. Other demands which got nowhere in the 1937 negotiations also apparently were to be included. Nothing surprising about this, even if true. There is no law against demanding; getting is something else again, as both sides to the impending negotiations well know.

• HARRY HOPKINS' appointment to the office of Secretary of Commerce may not be such a bad move after all. Nobody in our time has had greater experience in handing out relief. And nobody stands in greater need of relief today than the average business man. As a class, he isn't asking Uncle Sam to dish out cash relief—except occasionally through RFC. But he is crying for relief primarily from burdens and restrictions which are born in Washington. Maybe Harry can help out there. Line forms on the right, gentlemen, and please don't shove.

• ORDINARILY we have little sympathy with schemes to improve the competitive position of coal by taxing other fuels. Distaste for such strategy is twofold. First, it doesn't seem smart for one industry to advocate increasing the costs of the products of a competing industry. Second, if successful, what defense has the industry when it is later proposed—as it surely would be—to also put an additional tax on coal? Increasing the import duty on foreign oil, however, is in a different category. Present duties afford inadequate protection both to domestic oil and to coal. This is a situation which sound tariff making is designed to cure. Let's get the remedy working before Cordell Hull springs another reciprocal trade agreement.

• GOVERNMENT PURCHASE of 100,000,000 tons of bituminous coal over the next eighteen months as a war-time storage reserve has been suggested by Senator Watson, president, Elk Horn Coal Corporation. Such action, he contends, would be insurance against a recurrence of the fuel and transportation difficulties which beset the nation in 1917-18. Moreover, it would give increased employment and revenues to both railroads and mines at a time when such increases are sorely needed. If Washington wants to give the heavy industries a boost, here's its opportunity. It is spending billions on plans which promise much less in actual benefits.

No Progress?

ONE RULE all good government agencies usually follow is to make their annual reports to Congress read like a justification for their continued existence. The latest account of the stewardship of the National Bituminous Coal Com-

mission introduces no violent departure from tradition. Emphasis is placed upon the financial losses, estimated at $37,000,000 for commercial soft-coal mines in 1937 and a larger but unstated sum last year. Still greater losses, it is intimated, are inevitable unless the downward course is stayed by the kindly hand of government regulation.

The losses during the last nine months of 1937, declares the Commission, "occurred in spite of rapid technical progress in the effort to reduce the cost of mining." This deduction, convenient as it may be for the Commission's thesis, implies a conclusion which is highly misleading. Losses for the industry as a whole must be admitted, but the cost reports filed with the Commission give unimpeachable evidence of how technical progress has made it possible for efficient mines to operate at a profit.

In the three districts where strip-pit, mechanized deep-mine and hand-loading-mine costs have been shown separately, the hand-loading mines have had average costs ranging from 19 to 84c. per ton higher than their mechanized competitors. And in only one district is the average realization below average costs at mechanized operations and even there this realization is 15.7c per ton above the average strip-mine costs. The only two districts in which any margin above cost is shown in the Commission's report are districts where mechanization predominates. Some of these margins, it is true, are thin; but they are there. Average losses for the industry as a whole during the 1937 period were held down to 11.3c per ton because of, not "in spite of," the technical progress that was made in reducing costs.

Test the Tester

FLAME SAFETY LAMPS for detecting gas are effective only when those who carry them know how to use them. At the Oxcroft colliery in England, every fireboss is instructed to select on every shift a workman responsible for the flame safety lamp in his working place and to require him to make a test for gas in some specific place. The fireboss also tests the same place and then the results are compared. At the end of the shift, when the fireboss makes his report, he enters on it the name of the miner whose test for gas has been checked. Such a system assures the management that every responsible man in the mine has proved his ability to test for gas.

Mechanical Loading

BITUMINOUS production last year was 100,000,000 tons less than in 1937. The tonnage mechanically loaded, however, declined only about 3,000,000 tons. And the percentage so loaded increased. On the basis of figures available at this early date, it may be estimated that 25 per cent of the deep-mined output was handled by some type of loading equipment. Stripping probably accounted for somewhere between 9 and 10 per cent of the total soft-coal production of the year. This would give a combined total of nearly 32 per cent of 1938 output mechanically loaded, as compared with 25.7 per cent in 1937.

Mechanical loading, except in stripping, had a slow start, but now that it has hit its stride the pace is constantly increasing. Not the least significant fact brought out in the review on loading-equipment sales published elsewhere in this issue is that mobile loaders have been purchased in the past two years by 103 bituminous-coal companies that did not use such equipment in 1936. Conveyors have been installed by 114 companies that were not using any such device three years ago. More than half these companies are in the southern Appalachian States.

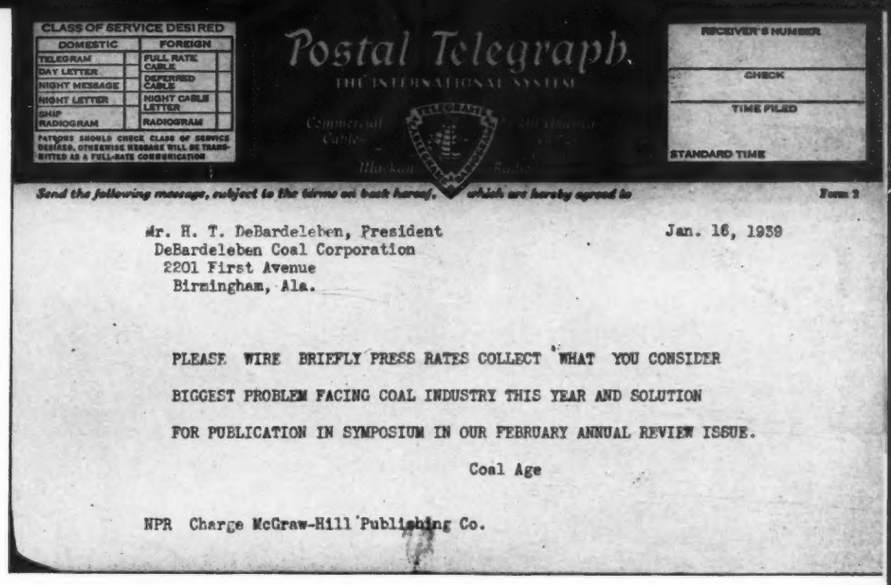
In the face of these trends, it takes no rashness to predict that within a very few years more than 50 per cent of the bituminous output will be mechanically loaded. The more rapidly this percentage rises the greater the promise of increasing tonnage and the recovery of lost markets. Only one thing can stop this upsurge. That is a wage policy penalizing the machine. Those who would take the lead in such a suicidal policy would be asking their followers to forgo opportunities for employment or accept a steadily diminishing annual income.

Not Gobbed

"OVER THE HILLS to the poorhouse" has many times been pictured as the tragic climax facing the faithful industrial worker when years take their inevitable toll. Not so, happily, in the case of thousands of mine workers. Many have risen to supervisory positions where the counsel of age is an asset. Hundreds of others have been shifted to easier tasks in and around the mines as declining years made their earlier jobs too arduous. Random records of old-age employment at three large anthracite companies were given on page 36 of the January issue. Many other producers—both anthracite and bituminous—also can show commendable records on this score.

Of course, it might be argued that one of the fundamental objectives of the federal social security act is to permit the comfortable retirement of workers who have passed the age of sixty-five. That objective is wholly laudable. But the law comes too late to materially benefit thousands now on mine payrolls and the present age of hundreds puts them entirely outside its provisions. These groups are protected by humane management policies such as exemplified in the article previously mentioned.

There is also another aspect to old-age employment which the advocates of retirement generally overlook. Many workers of the older generation have never learned to enjoy enforced leisure. To men in this category pensioned idleness is as irksome as any other kind. Compulsory retirement for such men while the spirit is still stronger than the flesh means a wrench that frequently spells an earlier death. Sometimes it may be desirable to subtract a little from theoretical efficiency to enrich humanity.



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Mr. H. T. DeBardeleben, President
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2201 First Avenue
Birmingham, Ala.

Jan. 16, 1939

PLEASE WIRE BRIEFLY PRESS RATES COLLECT WHAT YOU CONSIDER BIGGEST PROBLEM FACING COAL INDUSTRY THIS YEAR AND SOLUTION FOR PUBLICATION IN SYMPOSIUM IN OUR FEBRUARY ANNUAL REVIEW ISSUE.

Coal Age

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COAL-MINE PRESIDENTS SAY:

WHAT are the biggest problems facing the coal industry this year? What can or should be done about them? These questions were put to a selected group of coal-mining company presidents in different parts of the country last month in a telegraphic inquiry which read:

> "Please wire briefly night press rates collect what you consider biggest problem facing coal industry this year and solution for publication in our February Annual Review Issue."

Names were selected on a geographic and tonnage basis so as to give a representative cross-section of executive thinking on the questions. Replies were received from every major coal region and from every coal-producing State except two—Michigan and Montana.

Recovery of lost markets, these replies show, is a major problem in both anthracite and bituminous divisions of the industry. Nearly half of the presidents contributing to this symposium touched upon that question in one form or another. Tax burdens also rate high with the bituminous wing. Reflecting the interest aroused by the National Coal Association campaign on the subject, one soft-coal producer after another strikes at competition from unregulated fuels, cheap foreign oil and subsidized hydro-electric projects.

More than any other question, however, the Guffey Act and its administration ranks tops as a problem of major importance in the opinion of presidents of bituminous mines. Complaint of delay in promulgating minimum prices and the demoralizing effects of such delay is the theme running through many comments. Proponents of outright, unqualified repeal run a neck-and-neck race with those who suggest modification to make the law more effective or repeal if effective modification does not seem possible. A slightly smaller group plumps strongly for the act as the only salvation of the industry.

Labor also looms as a problem in executive review of the 1939 outlook. Without demanding a reduction in so many words, a number of producers, principally in the Appalachian fields, insist that wages should be readjusted on a basis comparable with scales paid in other industries. The miners, say several, must realize the gravity of competition with "laborless" fuels and cooperate with the coal producers in stemming that competition. From the Midwest and Rocky Mountain States come pleas for the early negotiation of new wage contracts to avoid needless stocking and shifts to other fuels.

The Guffey law, remarks one large Midwestern producer, was originally enacted to enable the operators to pay better wages. Since that time, however, labor as a whole has been given the protection of the National Labor Relations and the Wages-and-Hours acts. With these measures on the statute books to guard reasonable living standards for all wage earners, justification for special legislation for the bituminous-coal industry has ceased to exist.

Individual replies to *Coal Age's* telegraphic inquiry read as follows:

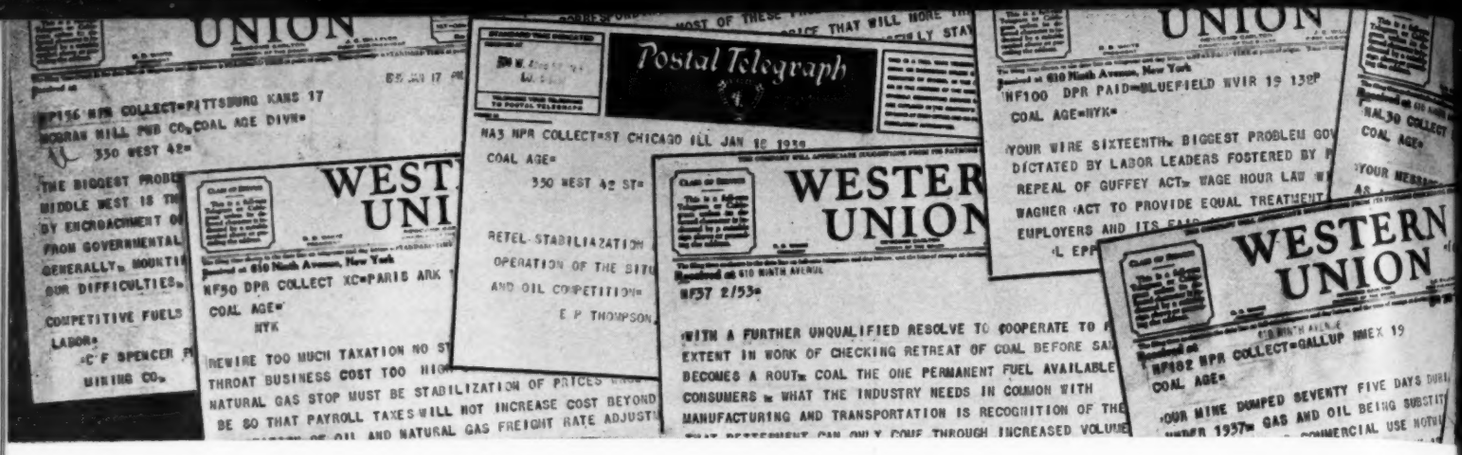
It would appear the coal industry faces a major problem the coming year in its cost to the consumer in relation to competing fuels and other forms of energy. The many elements making up this cost should be considered well by the leaders of the industry and every effort should be made to solve this problem.—JAMES PRENDERGAST, *Susquehanna Collieries Co.*

Biggest problem facing the anthracite industry is that of increasing sales. The industry has a great many problems, but the marketing problem is the basic one and most of the other problems of the industry have been created by the falling off of sales over the years. There was a further shrinkage of anthracite sales last year, but, as there was a similar shrinkage in sales of all fuels, due to weather conditions, the matter is

Problems of 1939

Coal's major problems of the year, in the opinion of company executives, are many and varied. The list includes:

- Guffey Act and its administration
- Meeting competition
- Government regulation of competing fuels
- Stabilizing selling prices
- Should the Guffey Act be repealed
- Wage rates and working conditions
- Relief from burdensome taxes
- Reduction in freight rates
- Recapture of lost markets
- Tax on imported fuel oil
- Help for the railroads
- Research
- Advertising
- Better preparation
- Government competition
- Conservation of natural resources
- Marketing agencies
- Reduced costs between mine and consumer



not as serious as it would be otherwise. There is an increasing awareness on the part of the public that anthracite is still the best fuel for home heating and that, burned with modern equipment, comfort and economy are both more fully obtained by the use of anthracite.—J. B. WARRINER, *Lehigh Navigation Coal Co.*

Biggest problem facing coal industry is to earn an honest dollar in 1939 and solution for it is to stop selling coal for less than it costs to produce.—JOHN C. HADDOCK, *Haddock Mining Co.*

Biggest problem facing anthracite industry this year is militant program of research and advertising to recapture markets lost to oil, gas and coke. This involves further development of proper burning apparatus as well as new uses for coal. Believe price now low enough to recapture lost markets if above program is amply financed. Look for few new developments in production end, with efforts centered largely on mechanized loading and development of concentrated mining system for reducing transportation cost. — JAMES H. PIERCE, *East Bear Ridge Colliery Co.*

In my opinion, the great problem facing the bituminous industry this year is to get the producers generally to realize that the price-fixing provisions of the Bituminous Coal Act are not merely worthless but are the worst disaster that has ever overtaken the industry, and to demand their repeal as promptly as possible, along with the passage of amendments to enlarge the opportunities for sales agencies to function legally under appropriate government supervision. Then the coal men can start pulling themselves out of the market demoralization caused by the present act and build a sound program of lasting improvement.—J. D. A. MORROW, *Pittsburgh Coal Co.*

The coal industry as a whole is doing an efficient job in mining coal at low cost. In my judgment, the biggest problem facing the industry this year is to find some way whereby a price can be obtained for the coal which will enable the industry to secure a reasonable return for its large investment. This can be accomplished if the entire industry will support wholeheartedly the National Bituminous Coal Commission in its efforts to bring about a fair fixation of prices under the Bituminous Coal Act. Voluntary cooperation in the industry seems to be an impossibility and, with the large overproductive capacity of the mines constantly pressing for a market, in my judgment the only solution is some form of governmental supervision.—H. L. FINDLAY, *Simpson Creek Collieries Co.*

Declining markets and fierce competition of oil and gas most serious problem. Conservation of natural resources requires the regulation of coal, oil and gas under one government bureau. Sane business management a great need in the coal industry. The sorry spectacle of leading operators fighting for business at prices away below cost of production shows the need of prompt regulation to save the industry from destruction or perhaps monopoly.—ANDREW B. CRICHTON, *Johnstown Coal & Coke Co.*

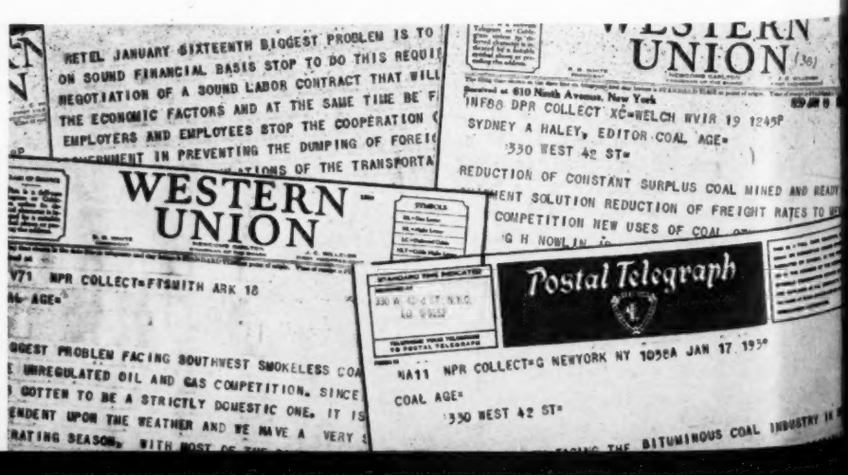
Greatest problem facing coal industry is preparing coal well enough so that the public will buy it and stop large increase in use of gas and oil.—JOSEPH PURSGLOVE, *Pursglove Coal Mining Co.*

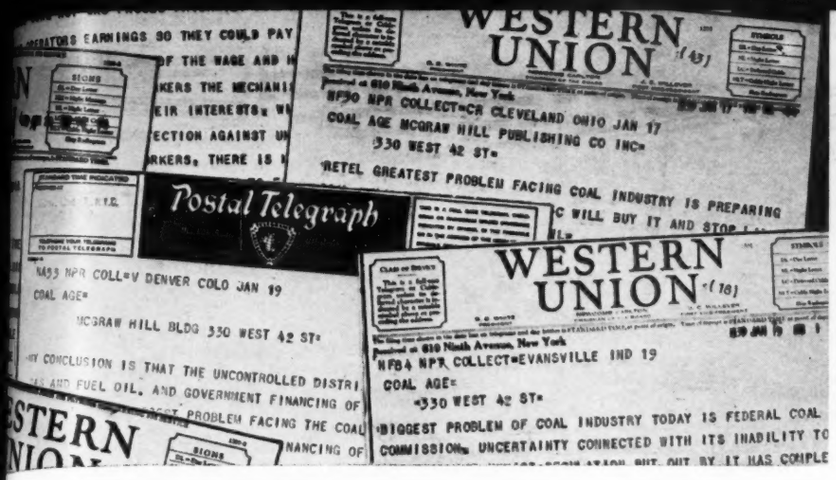
Chief problem facing coal industry unquestionably is discriminatory government legislation. Solution to problem is successful opposition to government subsidy of uneconomical water-power projects and St. Lawrence waterway treaty. Legislative regulation of coal industry demands similar action controlling non-labor employing competitors, notably producers of natural gas and fuel oil, on non-discriminatory basis. Further key to problem of coal industry and labor employment is reduction of railroad freight rates to reasonable competitive basis; also relief from general business taxes by Congress. Industry should protest 1c. tax on coal supporting only self-financing government agency—the National Bituminous Coal Commission.—*Barnes & Tucker Co.*

Biggest problem facing coal industry today is cutthroat competition and sale of coal below cost of production. Solution is price control, but prices should not be so high as to encourage competition from other sources of energy.—WM. P. CAYTON, *Rail & River Coal Co.*

Answering your telegram to Mr. Hill at his request, we think biggest problem of coal industry this year is to avoid being crushed between upper and nether millstones of high sales prices fixed by law or dictated by increase in costs of production. General economic and competitive conditions are adverse to high coal prices. It is immaterial whether they are inspired by the Bituminous Coal Act or by increased production costs. Either basis for establishing sales price levels is subject to the same criticism.

Remedy lies, first, in freeing the industry from hampering and rigid price-fixing provisions of the Bituminous Coal Act of 1937 and letting





it work out fair and flexible competitive prices and fair-trade-practice rules and regulations through marketing agencies of its own making and, secondly, in readjustment of wage rates, hours and working conditions in and around the mines to a basis more nearly comparable with those paid and prevailing for substantially similar type of work in other industries.—J. NOBLE SNIDER, vice-president, *Consolidation Coal Co.*

There may be solutions to the industry's problems, and I am beginning to have my doubts whether regulated prices will in the end be reasonably satisfactory. Perhaps government ownership of coal production, with the closing of many operations, will be the ultimate necessary evil. In an old-fashioned way Finnegan might possibly be paraphrased to give you an ordinary answer: "Less oil and free hydro-electric power; more coal demand; less coal supply."—ARTHUR B. STEWART, *Davis Coal & Coke Co.*

Greatest problem facing the bituminous coal industry, in my opinion, is how to continue solvent operation. Only possible solution I see is the promulgation of minimum prices by the Bituminous Coal Commission and enforcement of those schedules.—C. E. BOCKUS, *Clinchfield Coal Corporation.*

Reduction of constant surplus coal mined and ready for shipment biggest problem. Solution: reduction of freight rates to meet oil and gas competition; new uses of coal other than as a fuel.—G. H. NOWLIN, JR., *Premier Pocahontas Colliery Co.*

Outlook for first quarter of 1939 somewhat better than year just ended; conditions in coal industry after April 1 questionable.—FRANK COSTANZO, *Wheeling Coal Co.*

Consider greatest problem facing coal industry during coming year is whether cutthroat competition will continue or whether Coal Commission will function properly and bill be sustained by courts. Hope union will cooperate by not making additional demands.—C. C. HETZEL, *Georges Creek Coal Co.*

Great problems facing our industry are oil and other competitive fuels, excessive taxes and undernormal consumption of coal by industry in general.—*Virginia & Pittsburgh Coal & Coke Co.*

Biggest problem facing coal industry this year: stop National Bituminous Coal Commission. Best solution: complete repeal of Guffey Act, and taxes included on oil and gas used for steam purposes.—F. E. CHRISTOPHER, *Christopher Mining Co.*

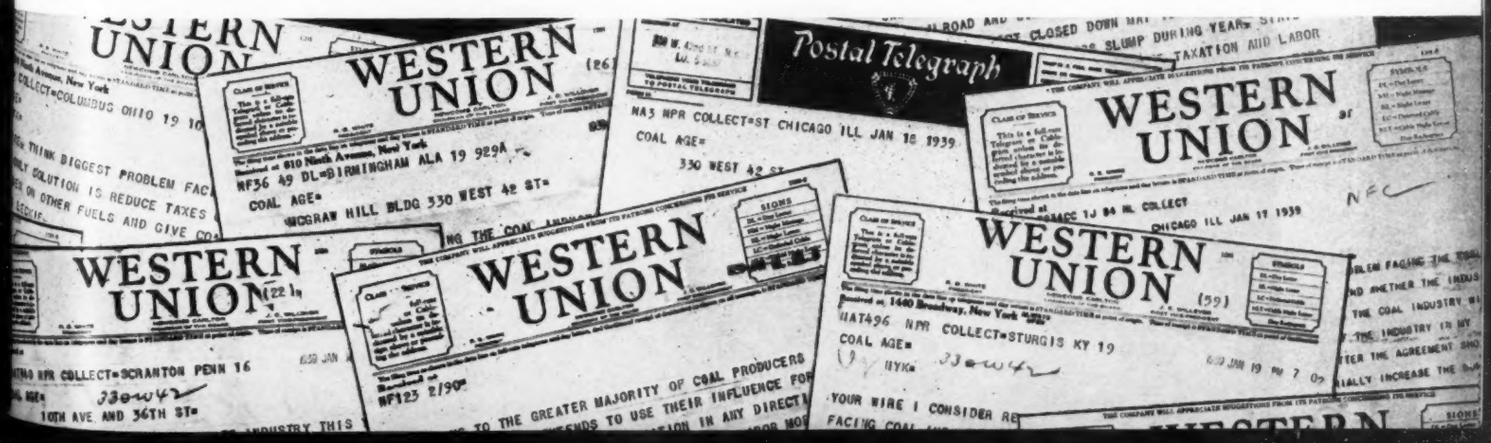
The continued attempt on the part of the government to control the coal industry through the impracticable Guffey Act and the high wages imposed on the industry are the two outstanding factors that are killing it. Repeal of the Guffey Act and a wage scale comparable to what other industries are paying is the relief that the industry needs.—O. L. ALEXANDER, *Pocahontas Fuel Co.*

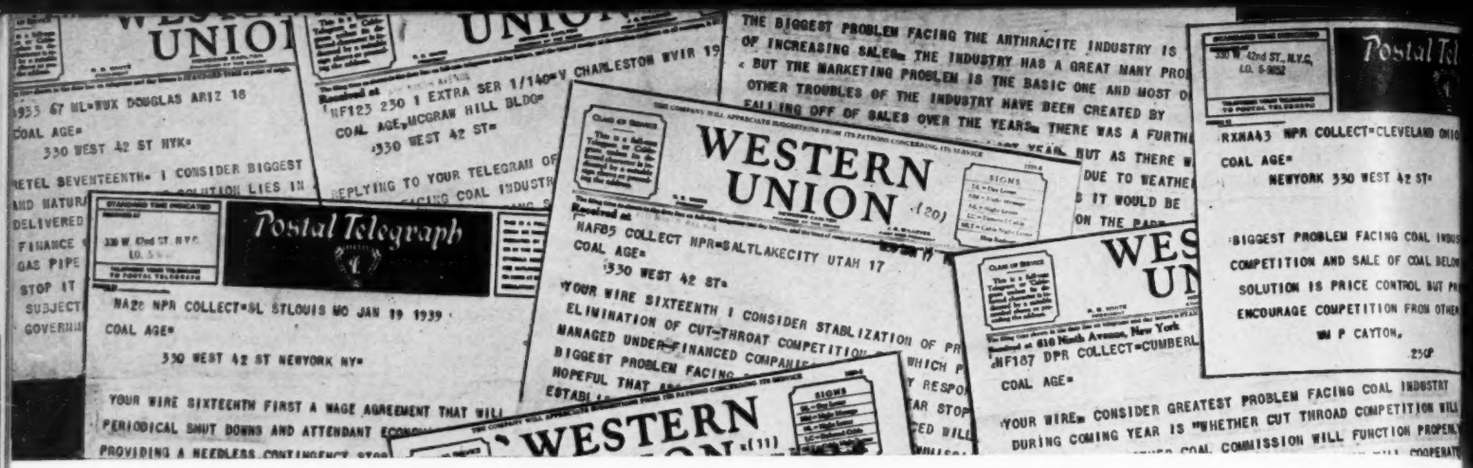
It is a foregone conclusion that crude oil now being shipped into this country from foreign nations is one of the most disastrous problems that the coal industry is facing today. Fuel oil from abroad should be properly taxed so as to prevent it from flooding the coal markets in this country without duty and taxation generally. This oil is doing more damage than any competitive fuel of any kind that I am familiar with. Second, much stress should be laid before the National Bituminous Coal Commission and it should be urged to publish selling prices for all districts at the earliest possible date.

The year 1938 has been very disastrous to the greater majority of producers. If the government intends to use its influence for the welfare of the peoples of this nation in any direction, there is nothing that would help labor more as a whole than the regulation of coal prices so that each consumer of coal can be satisfied that he is receiving his fuel on an equal basis with his competitor. The sooner coal prices can be established, the quicker we will have betterment for all concerned.—JOHN LAING, *MacAlpin Coal Co.*

Problems of the coal industry are the problems of industry as a whole: how to get a new dollar for an old one in the face of recurring cycles of increased cost and transportation, bringing with it decreased consumption until we are at the production of about thirty years ago. The problem of industry as a whole is to bring a right-about face of government and release private initiative. —GUY DARST, *Benedict Coal Corporation.*

From estimates available, the loss on bituminous production last year will amount close to $100,000,000. Unless immediate relief is given, the coal industry cannot survive. Numerous are the causes for this situation, in most part due to restrictions and acts of the Federal Government. The industry is burdened with fourteen different classifications of taxes which have added a burden in the last fifteen years of at least 15c. per ton. Oil from foreign countries is permitted to be imported with a very low tariff, which should be corrected. The industry should be relieved at once of taxes to support





the Guffey Act. Scale of wages paid based on the hours of performance is out of proportion to similar classifications of work. An early decision should be made whether the Guffey Act is constitutional.—F. F. TAGGART, *Spruce River Coal Co.*

Most pressing problem before coal industry is to obtain sufficient money from sale of coal to pay for cost of producing. Even in spite of winter season this is not being done at present time. Believe only way this can be accomplished is through operation of Guffey Act and sincerely hope prices can be established promptly which will sustain attacks in the courts.—W. P. TAMS, JR., *Gulf Smokeless Coal Co.*

Biggest problem facing coal industry this year is the unforeseeable consequences of government regulation, which in its nature cannot adjust itself to the ebb and flow of the natural laws of commerce. The solution lies in the removal of the regulations.—J. G. BRADLEY, *Elk River Coal & Lumber Co.*

Unprecedented extravagances of our government in appropriations of billions of dollars leading, in our opinion, to taxes so burdensome as to eventually crush business.—GEORGE W. ST. CLAIR, *Jewell Ridge Coal Corporation.*

Biggest problem is to put industry on sound financial basis. To do this requires, first, the negotiation of a sound labor contract that will recognize the economic factors and at the same time be fair to both employers and employees; the cooperation of the government in preventing the dumping of foreign oils in this country and the regulation of the transportation facilities of competitive energy.—C. A. CABELL, *Carbon Fuel Co.*

Biggest problem facing us is Guffey Act. Immediate prices or its repeal would immensely help industry and can see no relief for industry until this act is in force or it has been repealed.—FRANK L. HORNICKEL, *Anchor Coal Co.*

Biggest problem: government meddling dictated by labor leaders fostered by politicians. Solution: repeal of Guffey Act, wage-hour law, with amendment to Wagner Act to provide equal treatment both employees and employers and its fair administration.—L. EPPERLY, *Winding Gulf Collieries Co.*

The biggest problem facing the coal industry in 1939 is to get the cost and price of coal to a point where it is in more favorable position to withstand the competition from oil, natural gas, hydro-electric power and other fuels. This, plus cooperation, is what we need to build up the income of coal producers from the lowest of all of the heavy industries.—ALEXANDER BONNYMAN, *Blue Diamond Coal Co.*

Biggest problem for coal industry this year is the insincere appeasement policy of the Washington administration respecting industry in general.—GEORGE B. AGNEW, *Gauley Mountain Coal Co.*

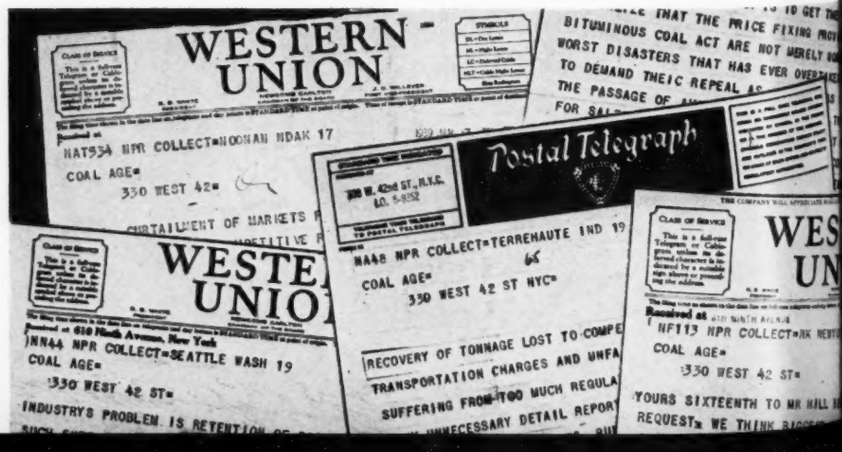
In my opinion the biggest problem facing the industry today is the competition of laborless fuel: i.e., oil and natural gas. The problem can be solved not by the industry itself but by cooperation of management, labor, railroads and legislation. Management must reduce costs by more efficient methods, which, in a great many instances, means capital investments. Labor must realize that we are competing with laborless fuels and be willing to accept a wage rate to put the coal industry in a competitive position. The coal-carrying railroads must accept and fight for lower freight rates on coal moving to principal market areas, thus securing volume and preserving their own industry. Congress must impose a tax on imported oil of at least 3c. per gallon. By cooperation of the above four bodies, coal would enjoy a return to the top production level, insuring prosperity for the coal industry, labor and the railroads.—C. A. HAMMILL, *Sycamore Coal Co.*

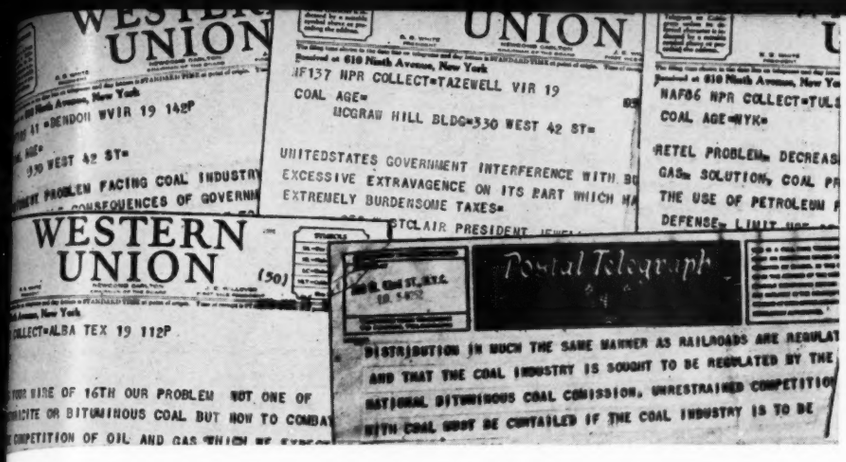
Think biggest problem facing coal is competitive fuels. Only solution is to reduce taxes on coal, put part of the burden on other fuels and give coal a fair chance.—W. S. LECKIE, *Leckie Collieries Co.*

Unquestionably the biggest problem is the question whether and when governmentally regulated prices will be established and whether they will stand up when established. Although the law is much too inelastic, its proper execution would undoubtedly be helpful. On the other hand, the disturbing effect of the long period of uncertainty respecting the execution of the law will never be fully reckoned.—R. W. LEA, *West Virginia Coal & Coke Corporation.*

Consider stabilization of prices coal industry's paramount problem. Believe solution to be government regulations similar to Bituminous Coal Conservation Act on competitive fuels and power with thorough policing and observance.—CARL MCFARLIN, *Tennessee Products Corporation.*

Troubles of coal industry: Coal Commission's unreasonable delay in stabilizing prices, lack of markets due to plight of railroads and industry, competitive fuels and hydro-electric power, high coal wage scales,





taxes more than the value of coal in the ground.—E. L. HAMPTON, *Tennessee Consolidated Coal Co.*

Every avenue of hope for the coal industry when explored points to a lower cost if competition is to be met. Declining production due to lowered demand and to inroads of unregulated fuel oil, natural gas and subsidized hydro-electricity has contributed to higher production costs. Wages have increased at a greater rate than can be offset by technological progress in production methods. Improvement in the situation during this year may be expected with improved business conditions and with a wage level adjusted to the needs of the industry in its competitive struggle, together with federal regulation of its competitive substitutes—fuel oil, natural gas and subsidized hydro-electricity.—HENRY T. DEBARDELEBEN, *DeBardeleben Coal Corporation.*

The largest problem facing the coal industry for 1939, in my opinion, is for miners and operators to adjust labor so as to eliminate loss to the operators and to bring costs of coal in reach of the public to gain the tonnage that has gone to competitive fuels.—E. J. ROWE, *Porter Coal Co.*

Coal industry so dependent upon railroads, who are the largest consumers of its product, I feel sure that prompt handling by the government of their problem will in a large measure restore the coal industry to its rightful place.—J. W. PORTER, *Alabama By-Products Corporation.*

The biggest problem facing the industry is that of convincing the general public that governmental competition through TVA, cheap imported fuel oil on which the import duty is ridiculously low, and unregulated competition from natural gas is gradually but surely robbing the coal miner of his means of livelihood and that, being thrown out of employment, the government must contribute millions of dollars to his support. The business man, as well as the general public, pays double for whatever saving may be effected through the above means by reason of the additional tax that must be imposed to feed and clothe the families of thousands of men thrown out of employment.

The average politician is not a business man and he must be made to understand that only an employed man is a prospective purchaser of merchandise in quantities. Until proper protection is given the men employed in the coal industry, and in fact in all industries, I think it futile to hope for increased employment because industry can only employ men to the extent of its ability to sell its products. Certainly the development and political distribution of TVA power and the bringing in of foreign oil, produced at starvation wages, under the guise of reciprocal trade agreements, have deprived the American miner and railroad worker of many millions of working days.

In the Southern field, some of the gas pipe-lines have gone through bankruptcy and the property bought in at a ridiculously low price; hence their dump rates to industry are very low and cannot be met by an industry that endeavors to pay a reasonable wage to its employees, particularly in view of the fact that freight rate must be added to the f.o.b. mine price of coal. When the farmer, the merchant and, in fact, the general public realize that the coal industry and the railroad industry are basic industries, employing a large number of men at good wages, it is probable that they will demand relief from those things that are gradually but surely strangling these two basic industries.—R. T. DANIEL, *Cane Creek Mining Co.*

Consider biggest problem facing coal business today overproduction; second problem, stabilization of prices. Suggest less government interference with coal trade.—T. H. COCHRAN, *Blue Bird Coal Co.*

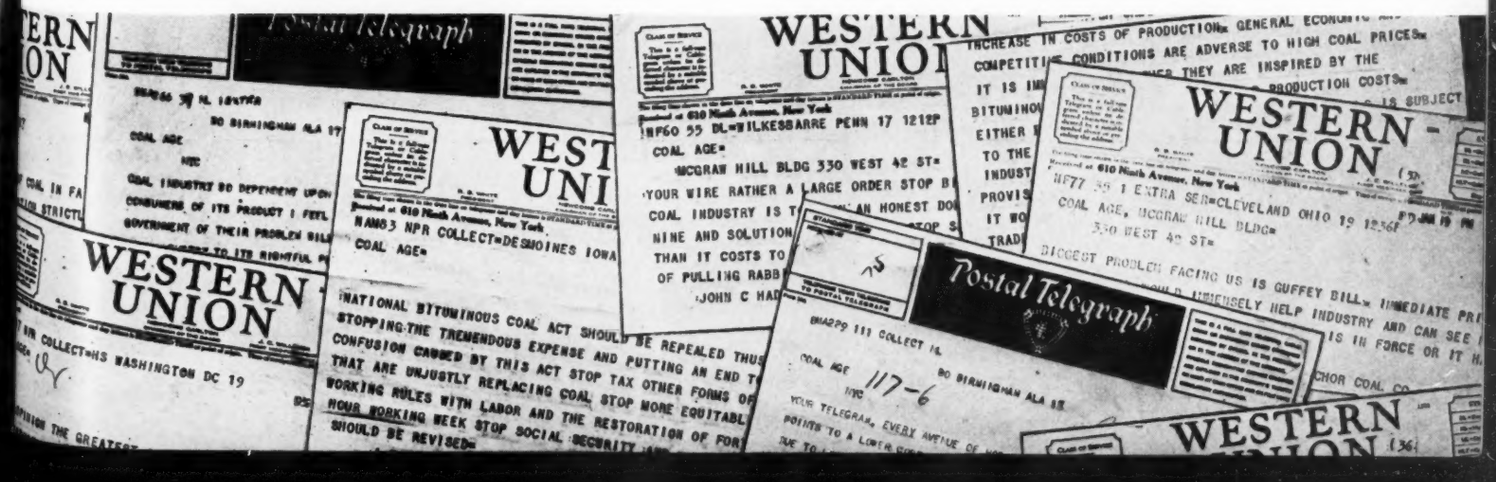
Biggest problem is Bituminous Coal Act. There should be either an immediate and practical price structure or prompt modification of the law or its repeal.—H. E. HOWARD, *Binkley Coal Co.*

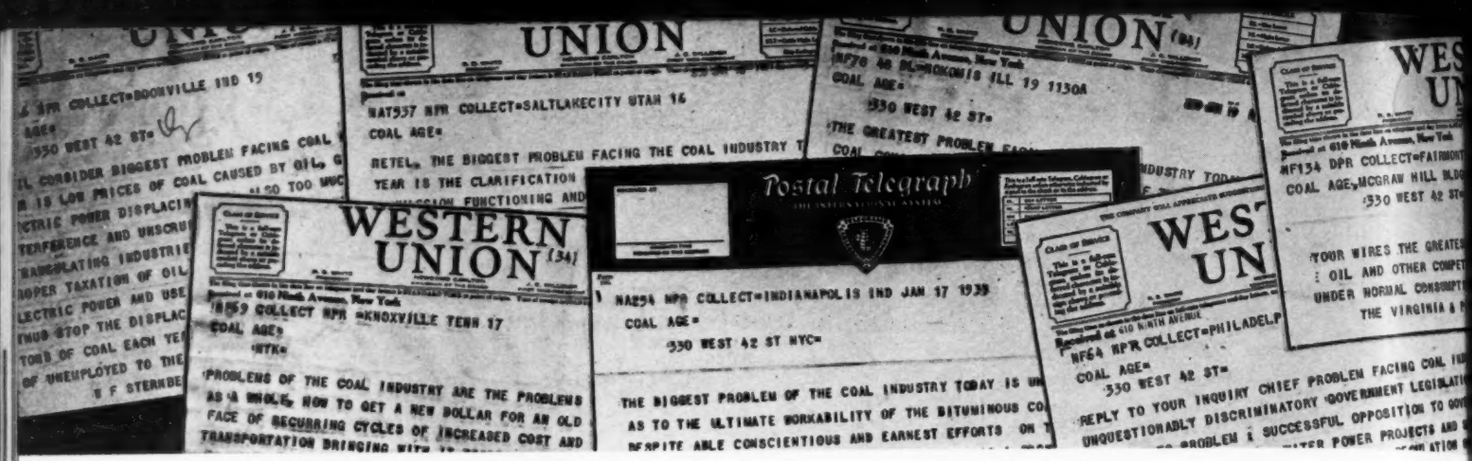
Wage-scale negotiations, in my opinion, are biggest problem facing the industry. Upon the results of these negotiations depend whether the industry will go forward or backward, whether the employees in the coal industry will get more work or less work. For the best interest of

A Four-Point Program

1. We must tell the public more about what we have to sell and why they should buy.
2. The industry should spend its time in trying to make our product more satisfactory in the way of refinement and support the equipment companies in the development of better burning equipment.
3. We need to quit apologizing for being in the business. We should take the offensive instead of the defensive.
4. Washington does not have the power to give us salvation. It must be earned by our own efforts.

—GRANT STAUFFER, *Huntsville-Sinclair Mining Co.*





the industry, in my opinion, the sooner an agreement is reached the better. The agreement should be such that it will permit the industry to materially increase the number of days' work per employee per year. —F. S. PFAHLER, *Superior Coal Co.*

First, a wage agreement that will insure against periodical shutdowns and attendant economic waste to consumers in providing a needless contingency storage supply; second, early authorization of minimum prices and marketing rules by National Bituminous Coal Commission to overcome painfully current low competitive prices that result under present thirty-day contract-extension ruling.—W. J. JENKINS, *Consolidated Coal Co.*

The greatest problem facing the industry today is the Coal Conservation Act. The inability of the Commission to make this act function after more than eighteen months has completely demoralized the market for coal. The solution is the complete repeal of the marketing provisions of the act.—RICE W. MILLER, *Nokomis Coal Co.*

There are many problems but present urgent one is the need for price stability. It is believed that conditions can be improved by replacement of present laws with anti-dumping legislation. Producers also must continually strive for more efficient operation with lower costs which will permit the continuation of the use of coal in many places now threatened by competing fuels.—LOUIS WARE, *United Electric Coal Cos.*

The biggest problem of the coal industry today is uncertainty as to the ultimate workability of the Bituminous Coal Act. Despite able, conscientious and earnest efforts on the part of the present Commission and its staff, there is a growing and I think now unanimous opinion among thoughtful operators that the fixing of prices by the government is not practicable.

The Bituminous Coal Act was passed primarily for the purpose of increasing operators' earnings so they could pay better wages to labor. Subsequent passage of the Wage-and-Hour and the Wagner acts has given mine workers the mechanism by which they can under the law protect their interests. With this assistance they have as much protection against unduly low living standards as other wage workers. There is no more reason, therefore, in my opinion, for the government to fix coal prices than there is to fix prices on any other basic commodity. I believe that the best thing that could be done for the coal industry would be repeal of the Bituminous Coal Act and thus allow the industry to proceed under free competition just as competition is free in other industries.—R. H. SHERWOOD, *Central Indiana Coal Co.*

Recovery of tonnage lost to competitive fuels through inequitable transportation charges and unfair trade practices greatest problem facing industry. Industry suffering from too much regulation, too many payroll taxes, too many unnecessary detail reports. Relief either by repeal or modification of some laws, rules and regulations would be helpful to this industry.—CHARLES N. TEMPLETON, *Glendora Coal Co.*

Consider biggest problem facing coal industry this year is low prices of coal caused by oil, gas and hydro-electric power displacing coal; also too much government interference and unscrupulous labor organizations strangling industries using coal. Solution is proper taxation of oil, gas and curbing of hydro-electric power, and use of coal for power generation and thus stop the displacement of hundreds of millions of tons of coal each year and thereby restore thousands of unemployed to the coal industry.—W. F. STERNBERG, *Boonville Coal Sales Co.*

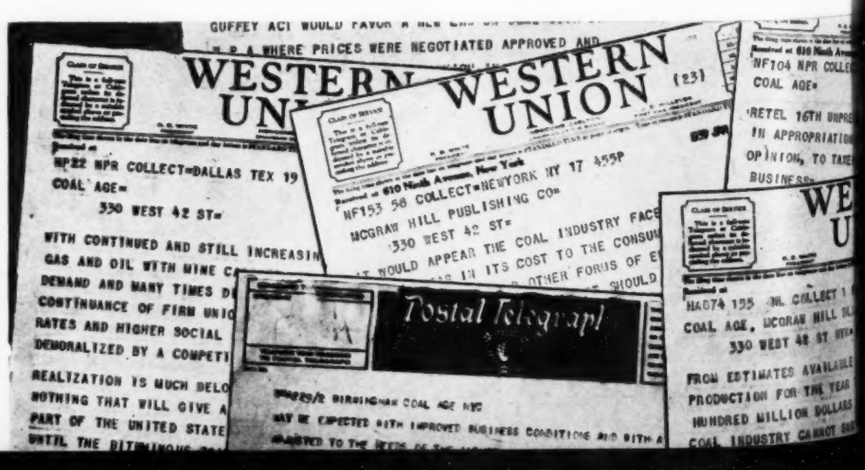
Biggest problem of coal industry today is federal Coal Commission. Uncertainty connected with its inability to function and unwise regulation put out by it have completely demoralized coal market. Realization for last year ten per cent under 1937. Think Guffey Act should be repealed.—DAVID INGLE, *Ingle Coal Co.*

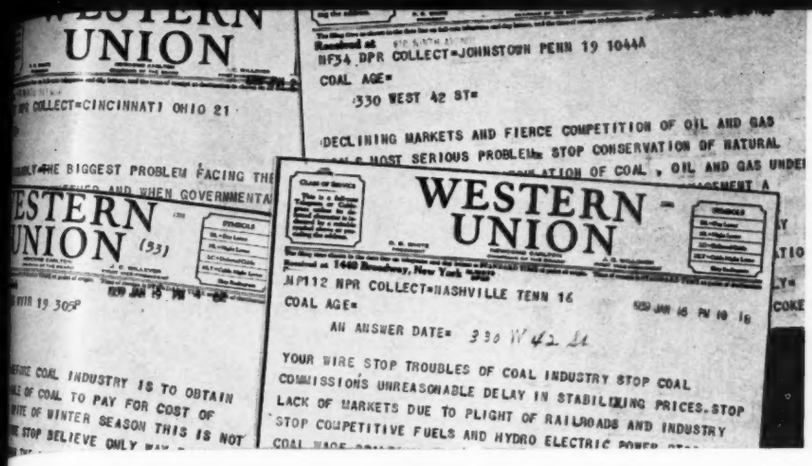
I consider repeal of Wagner Act biggest problem facing coal industry this year. In addition to that, National Bituminous Coal Commission fixing prices at once.—C. F. RICHARDSON, *West Kentucky Coal Co.*

National Bituminous Coal Act should be repealed, thus stopping the tremendous expense and putting an end to confusion caused by this act. Tax other forms of energy that are unjustly replacing coal. More equitable working rules with labor and restoration of 48-hour working week. Social security and Wagner acts should be revised.—A. E. HOLLINGSWORTH, *Central Iowa Fuel Co.*

Guffey coal code only working against operators. In Iowa district impossible to continue operations on present wage scale and prices.—WILLIAM ROY CARNEY, *Scandia Coal Co.*

Curtailment of markets for coal increasing rapidly through uncontrolled competitive fuels, excessive taxes; high wages put costs entirely





out of line; freight rates too high. Cost of production must be lowered so as to make coal more attractive to the consumer. If coal industry is to be regulated from Washington, other competitive fuels must also be so controlled.—HARRIS BAUKOL, *Baukol Noonan Lignite, Inc.*

The biggest problem confronting the coal industry in the Middle West is the declining market occasioned principally by encroachment of oil and gas, the uncertainties arising from governmental regulation and domination of business generally. Mounting taxes are contributing materially to our difficulties. Our solution lies in raising prices of competitive fuels and lessening demands of government and labor.—C. F. SPENCER, *Pittsburg & Midway Coal Mining Co.*

At present time the coal industry is severely hurt by the load of Federal and State excise taxes that are almost impossible to pass on to the consumer on account of the competition among ourselves and with other forms of energy. This could have been greatly helped by higher prices, stabilized by the present government commission, but, on account of the absence of stabilization of the market, prices have had no bottom and coal has been selling far below the real cost of production. Another problem vital—or rather nearly fatal—to the coal industry has been the attempt at legislative control of coal without corresponding control of our competitors. It is probable that most of these problems would cease if we can eventually maintain a price that will more than cover our costs and still let us successfully stay in the market with the competition of other forms of energy.—HEBER DENMAN, *Paris Purity Coal Co.*

Too much taxation, no stabilization of prices, cutthroat business, cost too high compared to oil and natural gas. Must be stabilization of prices, wages must be so that payroll taxes will not increase cost beyond competition of oil and natural gas, freight rate adjustment in districts. —J. J. SMITH, *New Shockley Co l Co.*

Biggest problem facing Southwest smokeless coal fields is unregulated oil and gas competition. Since our market has gotten to be a strictly domestic one, it is entirely dependent upon the weather and we have a very short operating season. With most of the railroads in our section using oil and other industries either oil or gas, our position is indeed a difficult one. This railroad and industrial business which we have lost to our unregulated competition, if given to our mines, would prolong our operating season and would truly be a life saver for our industry.—DEGEN BOYD, *Excelsior Coal Corporation.*

Problem: decreased use of coal in favor of oil and gas. Solution: coal-price fixation strictly enforced: limit the use of petroleum products as fuel except for national defense; limit use of natural gas to domestic purposes only. Benefits: decided increase of employment at high standard wages. —R. E. TAYLOR, *Ben Hur Coal Co.*

With continued and still increasing substitution of natural gas and oil, with mine capacity more than double winter demand and many times diminished summer demand, with continuance of firm union wage scales, advancing freight rates and higher social-security taxes, with prices demoralized by a competitive struggle until annual realization is much below irreducible costs, I know of nothing that will give a coal producer in the Southwest a possibility of better times until the National Bituminous Coal Commission or some other duly authorized governmental agency establishes and requires the maintenance of prices fair to the public but still sufficiently above production cost to enable a careful producer to realize enough for his product to pay agreed wages and at least return investments in coal-mining property. Until such stabilization of selling prices can be accomplished, Southwestern mines will be unable to make any contribution to the return of prosperity or the reduction of the national debt.—J. G. PUTERBAUGH, *McAlester Fuel Co.*

Our problem is not one of either anthracite or bituminous coal, but how to combat the fierce competition of oil and gas—which we expect to do with lignite briquets in the near future.—F. R. BLOUNT, *Consumers Lignite Co.*

Problem No. 1 is drastic reduction of cost of coal to consumer. No. 2 is effective and equitable conservation of all natural resources, particularly coal, oil and gas. No. 3 is equitable labor and management relationship. Solution of No. 1 new methods of coal production and distribution. Solution No. 2 may require Constitutional amendment giving Congress necessary powers. Problem No. 3 probably will solve itself through sheer force of necessity and applied intelligence.—CARSON W. SMITH, *Consolidated Coal & Coke Co.*

My conclusion is that the uncontrolled distribution of natural gas and oil and government financing of water-power projects constitute the biggest problem facing the coal industry. Solution: withholding of further government financing of water-power projects, gas and oil pipe-lines, and regulation of gas and oil distribution in much the same manner as railroads are regulated and that the coal industry is sought

to be regulated by the National Bituminous Coal Commission. Unrestrained competition with coal must be curtailed if the coal industry is to be able to properly function.—B. W. SNODGRASS, *Moffat Coal Co.*

I consider the biggest problem cheap fuel oil and natural gas. Solution lies in a more equitable delivered relationship. The use of federal money to finance oil-operated municipal electric plants, TVA, natural-gas pipe-lines and similar projects should be discontinued. It is unfair for one industry and its labor to be subjected to competition from other industries financed with government money.—LOUIS S. CATES, *Phelps Dodge Corporation.*

Our mine dumped 75 days during 1938, being 30 per cent under 1937. Gas and oil being substituted for coal both in railroad and commercial use notwithstanding one mine in this district closed down May 1, 1938, which would more than offset business slump during year. State mining laws, increased federal and State taxation and labor demands are increasing production costs to operators yearly, making coal mining unprofitable.—SHARP HANSON, *Gallup-Southwestern Coal Co.*

Stabilization of prices, gas and oil competition biggest problems. Proper operation of Guffey Act and equal taxation on gas and oil competition the solution.—E. P. THOMPSON, *Peerless Sales Co.*

The biggest problem facing coal industry this year is the clarification of National Bituminous Coal Commission functioning and duties. The industry cannot go on continually in the uncertain way it is now doing in regard to prices and competitive practices. If the Coal Commission cannot function as originally intended, the signal should be definitely given as quickly as possible so that cooperative action by producers would be free of uncertain restraints. —MORONI HEINER, *Utah Fuel Co.*

Consider biggest problem regaining lost markets by making friends for the industry by cooperative advertising of the benefits of burning coal and by cost adjustments to meet competitive fuels.—PAUL F. KEYSER, *Independent Coal & Coke Co.*

Greatest problem confronting coal industry is that for nearly four years futile attempt has been made to regiment and regulate the industry through the Guffey Act, which, while administered by a hard-working and capable commission, has failed and will continue to fail to make artificial prices for bituminous coal that will work and help the industry. On the other hand, this attempt to repeal the law of gravity has, through restrictions preventing the making of firm period contracts with consumers, turned thousands of such to non-taxed and non-regulated fuels with resultant loss of production and sales to operators and employment to mine workers.

My suggestion, standing on side line as operator of captive mines, is to repeal the Guffey Act quickly; the operators and mine workers get together as soon as possible arranging a nationwide wage agreement, with a further unqualified resolve to cooperate to fullest extent in work of checking retreat of coal before it becomes a rout. Coal is the one permanent fuel available to consumers. What the industry needs, in common with manufacturing and transportation, is recognition of the fact that betterment can come only through increased volume.—EUGENE MCAULIFFE, *Union Pacific Coal Co.*

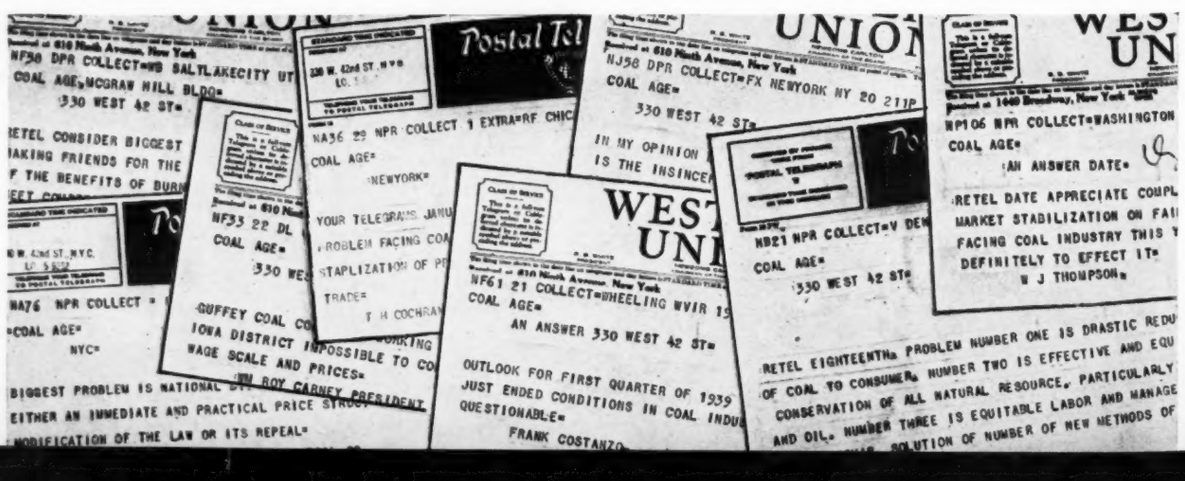
Market stabilization on a fair basis to all biggest problem facing coal industry this year.—W. J. THOMPSON, *Colony Coal Co.*

I consider stabilization of prices and elimination of cutthroat competition, for which poorly managed, underfinanced companies are usually responsible, biggest problem facing coal industry this year. Am hopeful that approved prices vigorously policed will be established by the National Bituminous Coal Commission at an early date, for I believe the problems of the industry can only be solved by an authoritative agency. If desired results cannot be accomplished under the Guffey Act, would favor a new law on some such basis as NRA, where prices were negotiated, approved and administered by districts, which, in my judgment, is more workable than the provisions of the present Guffey Act.—T. J. O'BRIEN, *Kemmerer Coal Co.*

Biggest problem facing coal industry, in my opinion, is federal regulation of coal vs. the non-regulation of competitive fuels. Many in the industry familiar with marketing conditions are impressed that the handicapping features of the Guffey Act as now drawn, when considered in conjunction with the non-regulation of competitive fuels, are resulting in substantial loss in market. The workability or unworkability of the act should be quickly determined and the act rewritten or amended so as to take in competitive fuels and in order that the coal industry may protect the market which it now enjoys.

It is unthinkable that the free flow of competitive fuels regulated only by supply and demand should be allowed to continue on that basis while coal is regulated artificially. Nothing I have said should be construed as a criticism of the Commission, which as a whole has been doing good work in building up the record of the industry notwithstanding the insurmountable barriers it has had to contend with resulting directly from weakness of the act. May I add that in an attempt to hold the industry's market every producer should support the National Coal Association in a stronger and broader national advertising campaign.—D. H. PAPE, *Sheridan-Wyoming Coal Co.*

Industry's problem is retention of present tonnage and to such extent as possible regaining some of that lost. To do either it must use every ingenuity in reducing costs to meet competitive fuels; also needs every consistent protection against unregulated competitive encroachment of other fuels. Such stabilization as Guffey Act would provide will be helpful, but industry must for domestic uses attempt to better organize and reduce costs between mine and consumer.—N. D. MOORE, *Pacific Coast Coal Co.*



COAL TIGHTENS LINES

+ In the Battle of Fuels

ALWAYS sensitive to changes in general business conditions, bituminous coal got off to a bad start in 1938 as a result of the deepening of the business recession of the previous year. Milder-than-normal weather in many sections also played a part in reducing domestic sales throughout the greater part of 1938. Production, however, turned upward after the middle of the year in response to the gain in business activity, with the result that some of the earlier losses were recouped to cut the tonnage drop to 22.6 per cent, as compared with 37 per cent in the first quarter and 32 per cent in the first half.

Competition Continues

Competition from other fuels and sources of energy again was a major problem in 1938. Government construction of hydro-electric facilities and financing of plants using competitive sources of energy was perhaps slightly less active last year. Prospects for long-term benefits for coal brightened as a result of an increase in sales of domestic and commercial stokers and also as a result of promotional campaigns either inaugurated or intensified by coal men and supported by labor and affiliated industries. Research was continued, but the outlook for maintenance of even the present program, let alone an expansion of work under the direct sponsorship of the industry, was uncertain in view of the absence of any signs of substantial support for the continuation of the activities of Bituminous Coal Research, Inc., in 1939 and succeeding years.

Soft-coal producers got a taste of operation under minimum-price schedules provided for in the Bituminous Coal Act of 1937, but only a taste, as the schedules were cancelled by the National Bituminous Coal Commission early in the year as a result of court opinions that proper hearings were not held before they were promulgated. Work on new schedules was started immediately, but had not been completed at the end of 1938.

The collapse of the first attempt at price-fixing under the act was a blow to the hopes of many producers, but in the meantime, the industry actively forwarded mechanization of loading and other cost-cutting activities and also continued the improvement of preparation facilities—both designed to better the future position of the industry from the standpoints of delivered price and delivered quality.

Total bituminous output in 1938, according to preliminary estimates by the National Bituminous Coal Commission, was 342,407,000 net tons, a decline of 100,048,000 tons, or 22.6 per cent, from the 1937 production of 442,455,000 net tons. Declines in stocks in the hands of industrial consumers and retailers were on the order of some 10,000,000 tons in 1938, while total lake shipments (cargo and fuel) dropped to 35,130,588 tons, compared with 45,246,236 tons in the preceding year.

Railroad coal consumption (Fig. 5) declined about 11,988,000 tons in 1938, or 14.6 per cent, while electric-power-utility consumption fell off about 7,068,000 tons, or 15.8 per cent. Figures for both railroads and utilities include, of course, a certain proportion of anthracite. As a result of a sharp drop in the production of pig iron, coal consumption for this purpose declined approximately 49 per cent, or around 25,500,000 tons, in 1938. In the same period, consumption by steel and rolling mills, coal-gas retorts, cement mills and "other industrials," on the basis of available data, decreased 37,269,000 tons, or 22.6 per cent.

Less susceptible to fluctuations in business and industrial activity, anthracite took a much smaller tonnage loss than bituminous in 1938. Production is estimated by the U. S. Bureau of Mines (preliminary figures) at 45,054,000 net tons, a decline of 6,802,000 tons, or 13.1 per cent, from the 1937 total of 51,856,000 tons. A major factor in this decline was warmer-than-normal weather in most of the anthracite-burning territory. Competitive fuels and the business recession also played a part in the final results.

Anthracite Presses On

In addition to other steps to improve their position, anthracite producers in 1938, along with soft-coal men, continued their opposition to federal competition and pressed their drives for lower freight rates and legislation designed to check unfair competition from oil and gas and imported coal by the imposition of taxes or duties. While the hard-coal industry was successful to a certain extent in obtaining, with the help of dealers and consumers, some concessions on intrastate freights, it received a setback in this department on March 8 when the Interstate Commerce Commission granted an increase of 10c. per ton on interstate shipments in a decision in Ex Parte 123.

The revised reciprocal trade pact with Canada was another disappointment to both the anthracite and bituminous industry—to anthracite in that it did not touch the Canadian import duty of 50c. a ton, although removing a 3-per-cent excise tax, and to soft coal in that, while it provided for remission of the excise tax, the agreement still let Canadian coal come into the United States free while retaining the Canadian duty of 75c. per ton on bituminous coal and $1 on coke. At the same time, the 40c. differential granted to Great Britain was not disturbed and Canada was left unrestricted in granting subventions to home producers.

Anthracite shared with soft coal the long-term benefits growing out of the activity in domestic-stoker sales, while the advertising campaign in-

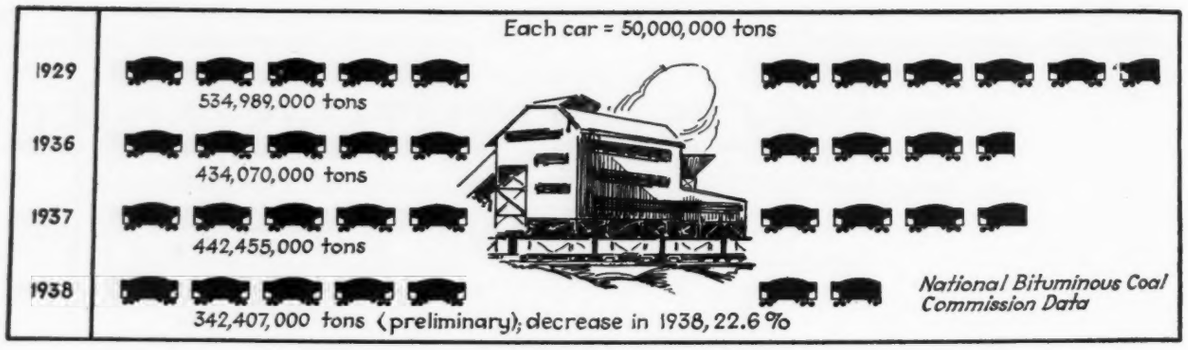


Fig. 1—Largely as a result of the business recession, bituminous coal ended 1938 with a 22.6-per-cent loss.

augurated with the formation of Anthracite Industries, Inc., three years ago, apparently began to be of real effect in checking the rate of loss to competitive sources of energy. With the resumption of its 1938-39 season program, the organization added metropolitan Sunday newspapers to its list of media for advertisements emphasizing the seven points of heating satisfaction found in anthracite, characterized as the "champion fuel."

While developments in the realm of coal theft were characterized by a recession in "bootlegging" activities ("bootleggers," incidentally, staged at least two strikes in protest against rates of payment offered by outlaw breaker operators), the hard-coal industry took up the problem of regulation by both internal and external agencies. On the industry's part, an open-price-filing system was placed in operation on Jan. 31 to stabilize market quotations, and on April 22, Stevenson, Jordan & Harrison, management engineers, were retained to administer the system.

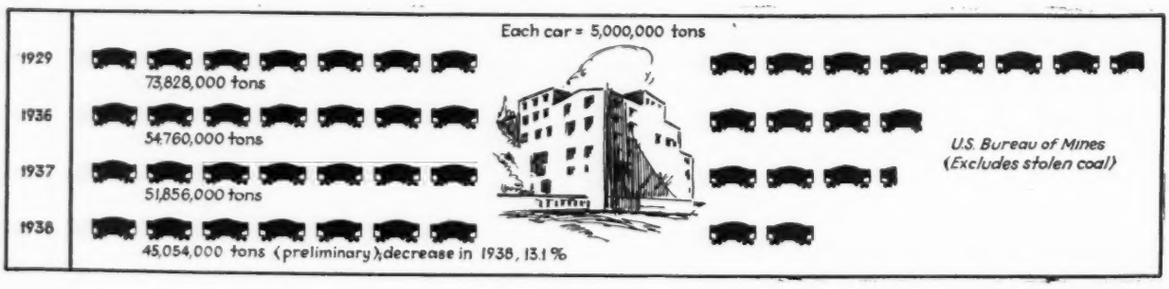
Growing out of the work of the Anthracite Coal Industry Commission, which started operations on March 4, 1938, initial steps looking to the regulation of the anthracite industry were taken by the State Legislature last year. These steps, however, were preceded by suggestions by the Governor that the Federal Government take over the ownership of the industry and threats of a Federal investigation to eliminate alleged monopolistic practices. The Anthracite Commission, on April 6, filed its final report, in which it recommended the establishment of a permanent State commission to regulate the industry by fixing prices; proposed the formation of a marketing corporation which eventually would eliminate wholesalers and retailers; and suggested that the problem of "bootleggers" and unemployed miners be attacked by the formation of three additional corporations to take over and work "idle" coal properties and lands.

Four measures to put into effect the above and other proposals were started through the Pennsylvania Legislature on Aug. 4. Briefly, these bills proposed the creation of a commission with a life of 50 years to regulate the industry and operate closed mines; empowered said commission to finance the plan through bonds or other obligations not payable by the State as debts; gave it authority ot fix prices and production and marketing quotas for every mine, license producers and police the industry; and authorized the formation of cooperative marketing corporations of three or more producers for greater sales efficiency. Producer representatives opposed the measures in hearings on Oct. 11 and 18 on the grounds of further tonnage losses, increased unemployment and greater burdens on the State.

Bedeviled by internal dissension, threatened with a Senate investigation and at odds with the Consumers' Counsel over the question of the latter's claim to the right of examining confidential data filed by producers as a basis for fixing minimum prices, which right finally was granted in January, the National Bituminous Coal Commission at the start of 1938 faced a growing list of complaints and injunction suits brought by producers and consumers against the price schedules promulgated late in 1937 and early in 1938. By the middle of February, three courts had granted stays against schedules on the ground that public hearings should have been held before they were promulated. Consequently, the Commission decided on Feb. 23 to suspend all prices effective Feb. 26 and proceed to hearings and the enactment of new schedules and marketing rules and regulations. On March 30, the Commission ruled that the 1936 cost data filed by individual producers as a basis for determining minimum prices could be introduced in evidence at a Commission hearing or in court.

The ruling on divulging cost data was to plague the Commission the rest of the year. Petitions by the Mallory Coal Co. and other producing organizations that the rule be rescinded were dismissed by the Commission on June 1, whereupon the companies went to the U. S. Circuit Court of Appeals at Washing-

Fig. 2—Anthracite output drops 13.1 per cent in 1938, largely as a result of mild weather coupled with competition from other fuels and a decline in business and industrial activity.



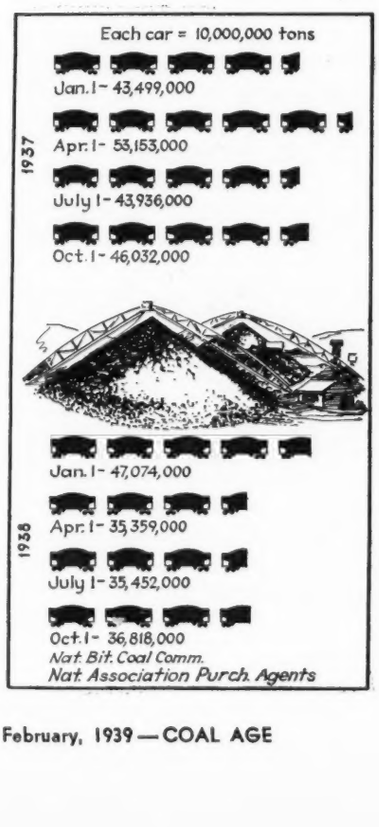
ton on June 7. The court, however, refused a stay on jurisdictional grounds on Aug. 1. On Sept. 14, however, 22 companies in West Virginia, Pennsylvania, Utah and Wyoming were granted a temporary injunction in view of the fact that the Commission had stated that the cost data would be opened for view at Denver Sept. 10 and later in Washington. On Dec. 5, the stay was revoked, and on Dec. 16, the Utah Fuel Co., et al, filed a petition for a writ of certiorari in the U. S. Supreme Court, asking review of the appellate court decision. The court granted the writ on Dec. 19 and set arguments for the week of Jan. 3, 1939.

In the meantime, the Commission proceeded with its determination of costs for use in setting the new price schedules, and on Sept. 14 issued the last of a series of orders to all producers to file proposed minimum prices and marketing rules and regulations. This was followed in December by the first of a series of coordination hearings. On Oct. 5, the city of Atlanta filed suit in the Federal district court at Washington contending that the Guffey-Vinson act was unconstitutional.

Revocation of the price schedules early in the year gave renewed stimulus to the sales-agency idea. Southern high-volatile operators producing approximately 72 per cent of the tonnage in that district voted to market through Appalachian Coals, Inc., the pioneer sales agency, while new recruits flocked to the Smokeless Coal Corporation and other agencies already in existence. Five new agencies were formed in 1938 and received the provisional approval of the Coal Commission, as follows: Fairmont Coals, Inc.; Kentucky Coal Agency, Inc.; Middle States Fuels, Inc.; Southern Illinois Coals, Inc.; and the Western Pennsylvania Coal Corporation. Others were under consideration at the end of the year.

In the struggle for the consumer's fuel dollar, the bituminous industry last year took satisfaction in an intensified advertising and promotional program, in increased stoker sales and in other measures for holding their markets, including support of taxing or regulatory legislation, opposition to government competition, etc., which in some measure compensated for the continuing pressure of substitutes. On the basis of eleven months' figures by the U. S. Bureau of Mines, consumption of gas oil, distillate fuels and residual fuel oils totaled 405,000,000 bbl. in 1938, a decrease of 8.4 per cent from the 1937 record of 442,353,000 bbl. Of these totals, approximately two-thirds was absorbed for heating, railroad use, bunkering, and gas and electric-power production.

Fig. 3—With no disturbances in the industry and markets, bituminous stocks decline in 1938.



Oil-Burner Sales Drop

Shipments of oil burners to the United States, however, excluding large boiler-burner and furnace-burner units, registered another decline to 116,000 (estimated) in 1938, compared with 164,492 in 1937 and 172,205 in 1936, according to Bureau of Census reports. On the other hand, factory sales of Classes 1, 2 and 3 stokers (domestic, commercial, etc., up to capacities of 300 lb. per hour) again increased in 1938 to an estimated total of 102,000, compared with 98,521 in 1937. The 1938 total includes some 13,000 small residential stokers burning anthracite, as compared with 9,074 units of this type sold in 1937.

Consumption of oil, gasoline and diesel fuel for yard and road-train service by Class 1 railroads (Fig. 5) decreased about 9.1 per cent in 1938, compared with a 14.6-per-cent decline in coal. Electric-utility oil consumption was off approximately 7.3 per cent in 1938, while natural-gas consumption went up about ½ per cent. In contrast, coal use by utilities dropped 15.8 per cent.

Total natural-gas consumption in 1938, on the basis of sales reported

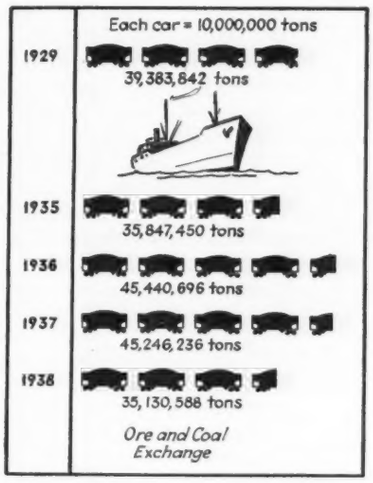


Fig. 4—Lake shipments drop in 1938.

to the American Gas Association, declined approximately 8.4 per cent in 1938, although the number of customers rose 2 per cent. Domestic and house-heating sales were off 2.5 per cent; commercial sales were down 3.1 per cent; and industrial sales, excluding public-utility consumption, were 14.7 per cent lower. In order of volume, industrial sales were nearly 50 per cent of the total in 1938, with domestic and house-heating sales aggregating close to 30 per cent. Manufactured-gas sales, as compared to natural gas, increased 2.5 per cent in 1938, with house heating leading the list with a 10-per-cent rise.

Government competition with coal was marked by some decrease in severity—at least from the standpoint of number of projects proposed, approved or under way—in spite of the fact that administration agencies were the winners in a number of court tilts. One successful contender, with the Supreme Court yet to hand down a decision, was the Tennessee Valley Authority, which continued to press its program of supplying hydro-power to municipalities in its territory.

TVA had its difficulties in 1938, however, one of which grew out of an internal row among the directors, culminating in the removal of Dr. A. E. Morgan as chairman and the passage of a resolution to investigate the Authority offered by Senator Norris, the father of TVA, on Jan. 3. After adoption by both houses, the resolution was signed by the President on April 4. The subsequent investigation was marked by extensive recriminations. Meanwhile, TVA won a victory over eighteen power companies when the U. S. Court for the Eastern District of Tennessee held

on Jan. 21 that the authority had a legal right to compete with private companies, even though such competition would result in their destruction. On May 18, the Supreme Court consented to review the case, in which the utilities contended that the TVA act was unconstitutional. Although arguments were received, no decision had been handed down at the end of the year.

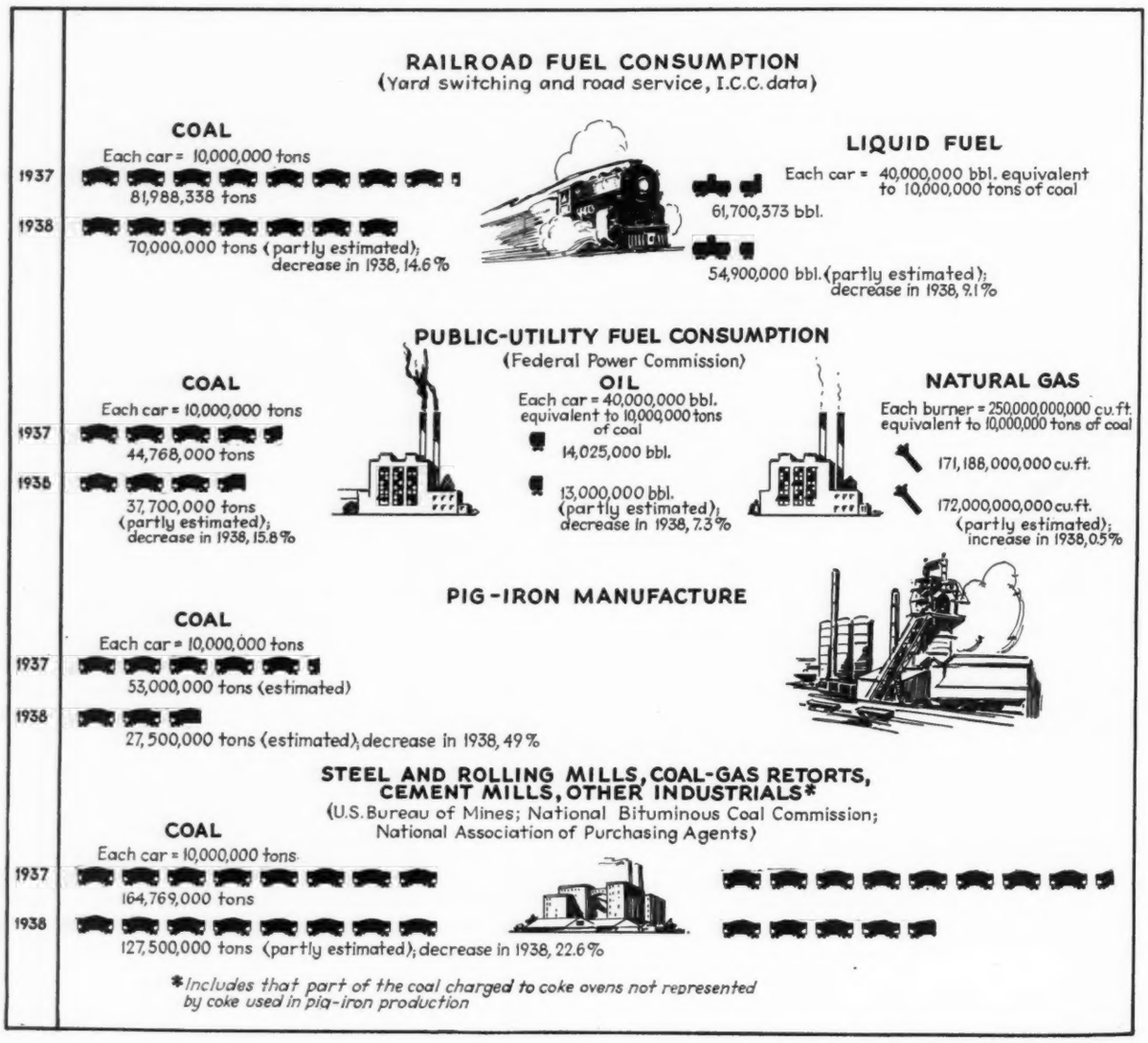
The Government's policy of loans and grants to municipalities for the construction of electric plants competing with private enterprises was upheld in two unanimous decisions by the Supreme Court on Jan. 3, 1938. Such competition, even though destructive, is not illegal, the court maintained. With the handing down of the decisions PWA Administrator Ickes announced that they released $109,700,000 to 61 projects held up by injunctions granted power companies in 23 States.

Counter-measures employed by the bituminous industry in the war with substitutes included continuation of the national advertising campaign instituted in 1938 and the development of a new promotional program designed to show industry, labor and the public just how much they benefit through increased mine operation and consequent opportunities for the employment of miners and others engaged in the transportation and distribution of coal. Both these activities were carried on by the National Coal Association, with supplemental programs by individual producers, sales agencies, regional operator and trade associations, labor organizations, etc. An offshoot of the campaign was the formation of several district promotional organizations in 1938, in addition to those already in existence.

Extension of its advertising campaign in 1939 was announced as one of the major N.C.A. objectives last year. Educational advertising directed primarily to the nation's architects and builders, "which has had such good results," was scheduled for continuance, and in addition the association moved to broaden the field and include additional periodicals intended to reach building managers and rental agents, heating contractors and equipment dealers, and the nation's retail fuel merchants. Advertising campaigns also were adopted by a number of sales agencies and associations not already in this field, of which one example was a newspaper campaign launched late in the year by the Pocahontas Operators' Association stressing the origin and advantages of Pocahontas coal.

The outstanding development in the battle against competition in 1938, however, was the National Coal

Fig. 5—How coal consumption fared in certain industries in 1938, as compared with competitive fuels.



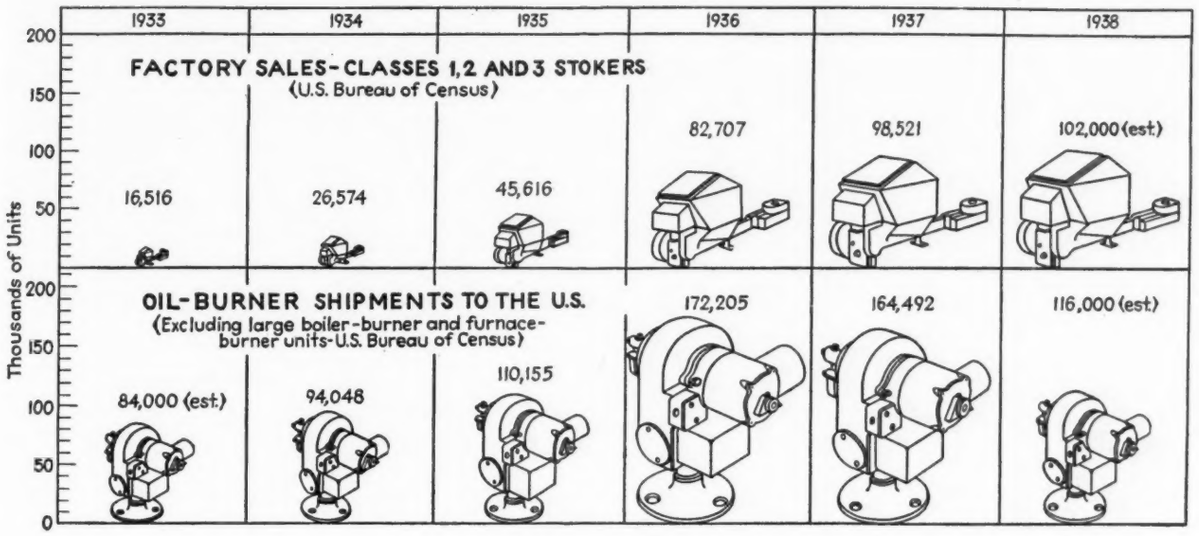


Fig. 6—Small-stoker sales gain while oil-burner shipments to the United States again decline in 1938.

Association's campaign to bring out the part the coal industry plays in the national welfare. The genesis of this promotional effort was a modest program for the recovery of tonnage lost to fuel oil and hydro-electric power in New England, which got under way with press releases on March 30 and April 4 stressing the fact that when manufacturers replace coal with laborless substitutes they are pursuing a course calculated to impair consumer purchasing power and thus reduce the market for their own products.

Freight-rate hearings, it was pointed out, had revealed that 1,117 manufacturing and industrial plants in New England, representing an annual consumption of 6,262,820 tons, had switched to oil or hydro-power. Each ton lost, the association contended, resulted in the permanent displacement of one day's work and wages for one man in the mines, on the railroads or engaged in other activities concerned with the production, transportation, distribution and delivery of coal. On the other hand, improvements in the efficient use of coal, it was pointed out, have made it even cheaper to use in spite of an increase in per-ton cost since 1932 due to higher wages and other increases in mining costs.

With the New England campaign as a starter, the National Coal Association opened up with its biggest guns on July 5 in a national program designed: first, to acquaint the industry itself and all other interested persons with the facts of the competitive situation, and, second, to enlist their concerted support of measures designed to keep imported oil out of the country by a sufficiently high excise tax; stop the "dumping" of natural gas on the industrial market at give-away prices; regulate rates charged by oil and gas pipe lines; and check federal subsidies for hydro-electric projects and loans and grants for the construction of pipe lines and power plants using substitute fuels. Losses to the coal industry from oil, natural-gas and hydro competition were 52,000,000 tons greater in 1937 than in 1930, it was pointed out. At the same time, the contention that manufacturers were hurting themselves by going to substitutes—the main point in the New England program—was reiterated and expanded.

With the first phase of the campaign directed primarily toward acquainting every person in the industry, the public in mining regions and all available persons in related transportation and distribution industries with the facts and the remedies proposed, mainly through the use of posters, news releases and addresses on coal and coal problems for presentation at meetings of the public, the association embarked on the second phase of its campaign on Sept. 8 with the issuance of a folder entitled "Why." Addressed to industry in general, the material in this folder was designed to present succinctly the reasons why those who would sell equipment, goods or services to the bituminous industry should be concerned with its problems and the suggested remedies. At the same time it was made clear that the industry did not expect reciprocity as a special privilege but asked only support in the elimination of practices and legislation fostering unfair competition.

The scope of the N.C.A. plan is evidenced by the fact that within three months posters, cartoons, leaflets, booklets, stickers and envelope stuffers to the number of 49 had been issued, the grand total of copies of this material reaching 5,815,500! Support by operators, employees, members of affiliated and interested industries and the public in mining districts reached a new high. Operators and miners, in particular, did yeoman work in seeing that the facts were disseminated as widely as possible, as did a number of existing and newly organized reciprocal-trade associations. As an example, one of the most active of the established organizations—the Illinois Reciprocal Trade Association—launched on Aug. 2 an intensified campaign to make everyone in Illinois coal minded and get them back of the N.C.A. program, one of the objectives being to increase the effectiveness of the association by completing organization in all parts of the State. New promotional and reciprocal organizations formed in other parts of the country in 1938 included: the Alabama Coal Trade Extension Association (producers, miners and railroad unions), Eastern Utah Associated Industries, and the coal committee of the Bluefield (W. Va.) Chamber of Commerce. Public reception of the campaign was evidenced by such incidents as the boost for coal given by D. E. Matthews, general manager of Lewis, Hubbard & Co., wholesale grocers of Charleston, W. Va., at a Cincinnati Chamber of Commerce Forum luncheon on Nov. 29, attended by several hundred businessmen.

Soft coal's long fight for freight relief, however, received another setback in 1938 when the Interstate

Commerce Commission, on Nov. 30, ruled in Ex Parte 115 that the surcharges on bituminous coal granted in 1937 and scheduled to expire on Dec. 31 of last year could be extended indefinitely, thus virtually making them a permanent part of the freight structure.

With no contracts up for renewal, labor relations in both the anthracite and bituminous industries were for the most part on the even keel usually characterizing operations under established agreements. The exceptions were mostly in the soft-coal industry and grew largely out of fights between the United Mine Workers and the Progressive Miners of America for jurisdiction at certain operations, in which fights the National Labor Relations Board usually was drawn in. One exception to this jurisdictional pattern was the trial of 39 persons and 16 coal companies under the Wagner Labor Relations Act on charges of conspiracy to thwart unionization in southeastern Kentucky and Harlan County particularly. With a jury disagreement, the first trial came to an end on Aug. 1 at London, Ky., and a second trial was ordered on Oct. 1. By the end of the year, however, most of the companies in the district had signed up with the United Mine Workers. The year 1938 also was marked by an attempt by the Progressives to set up organizations in other districts in addition to their home district of Illinois. Gains, however, were not noteworthy in spite of the fact that the Progressive organization was granted a charter by the American Federation of Labor on April 21.

ANTHRACITE MINES

+ Make Modest Technical Gains

IN THE anthracite region, financial reconstruction eventually will lead to further technical development, but during 1938 it failed to exhibit any such tendency.

As a result, mechanization of loading made little progress in the past year. Its principal advances are being made in thin and flat coal. One company, which had a seam that was thin and pitched 45 deg. and covered only a small area, realized that it would not pay to sink a slope with all its costs of operation; so a chute was driven down the dip and a scraper conveyer was installed on it to bring the coal up to the gangway. Other conveyors will be provided to bring the coal to the scraper conveyor. Such installations may be found in several places, for the hardness of the rock in the anthracite region and the need of space for timber to support roadways makes cost of construction heavy.

In another case, a belt conveyor 1,500 ft long was installed for the removal of a thin seam. Chain conveyors and shaking conveyors deliver the coal from the breasts to the belt. However, as it was necessary to get supplies to the miners, bottom was blown in the beltway to afford the necessary height.

At the mines of the Lehigh Navigation Coal Co., where carbon-steel plates on steep pitches were exposed to such corrosive water that they rotted in about three weeks, experiments are being made with acid-resisting stainless steel. The system used in mining the Mammoth bed on the Fifth Level of Lansford mine by chutes in the rock and in the Skidmore bed, which underlies the Mammoth (*Coal Age,* August, 1938, p. 25), has been modified by the addition of an experimental section in which the same retreating principle of operation is followed, but in which the slants are broken by chutes driven straight up the pitch, followed by slants to the taps through which the coal is reached. As the Skidmore has become thicker, this bed is being used instead of the rock under the Mammoth for the development of the sublevels.

Fortunately, anthracite dust will not explode, hence where there is no methane, adobe shots or shots without even a clay or similar covering can be safely fired. Such shots are quite commonly used wherever overhanging brows that are difficult to shoot threaten the miner or where big chunks of coal block the battery chute. Though safety does not demand a coat for the explosive, it gives better results if one is provided, however light it may be. The explosive strikes a heavier blow and the quantity of flame is reduced.

The Lehigh Navigation Coal Co. has been using blasting bombs which, at first, were made of hemispherical rubber containers of about 2½-in. diameter in which the charge of explosive gelatin was placed. The bombs could be attached to the end of a long stick and thus affixed to rock or coal, even if these surfaces were vertical or sloping heavily, and the lips of the hemisphere, being smeared with a rubber compound or sticky clay, would hold the bomb in position until fired. To obtain the desired assurance that the explosive actually was in contact with the coal in the battery chute, men did not have to risk entering the battery to wedge the explosive between two chunks, so the placing of the new device was inherently safer than the positioning of an ordinary stick of dynamite. Today the bomb or cap is made of paper, which is less expensive but serves the purpose well. The adhesive which holds in place the hemisphere, like a sea anemone on a rock, is a sticky mud.

Roof support for gangways is becoming a more and more perplexing problem with companies turning to rock tunnels for its solution, but the Hudson Coal Co. has had success with steel semicircular arches with vertical legs set solidly on rock with no stilts to take up rock movement, which, while much more permanent than wood, possibly will not be found successful when roof pressures heavier than those at present are experienced. Not even for permanent timbers do many of the companies favor treated timber because too often it is broken by pressure long before casual observation shows that it has been weakened by bacterial decay. Before long many anthracite

companies may be compelled to drive their main roads in rock or to use steel timbers with members which without breaking or binding will yield under excessive pressure, permitting rock or coal to carry the burden while keeping most of the gangway cross-section unimpaired.

As a contrast to some of the other operating features, preparation made a definite step forward in 1938. The total gross addition to feed capacity per hour in 1937 was 2,021 tons; in 1938, it was 3,753 tons. To such figures a degree of chance must always inhere, and the past year is credited with 1,400 tons of feed capacity per hour installed at a single large plant —the Huber breaker of the Glen Alden Coal Co. Even when the 1,400 tons is deducted, however, the figure for 1938 stands at 2,353 tons, which exceeds the tonnage of the previous year.

Some of the increases were installations or additions to the equipment of recently formed companies, of which there are many, but the same condition applies to 1937. Some additions merely rounded out provisions which in preliminary construction were omitted, though many may have been planned but not executed.

Despite the new construction, the net gain in preparation facilities will be small, being mostly replacements of old equipment or of installations which are less efficient, less accurate and more wasteful of energy and labor.

Huber Streamlined Breaker

Most striking of any of the new units is the Huber breaker, at the mine hitherto known as the Maxwell colliery, which breaker with its majestic modernistic lines is depicted in an accompanying illustration. It is equipped throughout with Menzies cone separators, of which there are fourteen, treating sizes from stove to No. 2 barley and manufactured in the Glen Alden Coal Co.'s own shops under an arrangement with the patentees. The Huber breaker will treat the coal not only of the newly named Huber colliery but of the Buttonwood operation.

Among the tendencies is a disposition to return to the practice of cleaning each size, or a narrow range of sizes, separately, as in the earlier days of cleaning. Some are making a middling product from the prepared sizes which is ground down to steam fuel. Demand is growing for the finer coal, particularly No. 4 and even No. 5 buckwheat, for use as pulverized fuel. Renewed efforts are being made to clean these sizes more thoroughly. To recover them at suitable cost, a vibrating screen has been introduced with a large capacity for dewatering and sizing. This fine coal ultimately may have to be marketed, for objection may be raised to its disposal either in the streams or near them, or in dry dumps which the wind may erode and disperse. Hence, interest in the problem is an evidence of forehandedness.

During the year E. I. du Pont de Nemours & Co. released information relative to its new system of cleaning, which was sucessfully demonstrated in commercial operation at a plant adjacent to the Weston breaker of the Weston Coal Co., at Shenandoah. This system uses liquids which are naturally heavy and not made so by the suspension of solids. These are heavier than calcium-chloride solutions. Hydrocarbons combined with the halogens, bromine or chlorine, to form tetrabromethane, pentachlorethane or trichlorethylene are used as sustaining or "parting" liquids. Unlike the liquids formerly used for the purpose, they are ill-disposed to mix with water (*Coal Age,* May, 1938, p. 74).

A du Pont classifier of an entirely different type from the equipment at Shenandoah is under test at the mines of the Lehigh Navigation Coal Co., cleaning No. 4 and No. 5 buckwheat.

With the wide variation in the quality of coal in the several parts of any one coal bed or in the many coal seams of the Carboniferous-Permian series, it is beginning to be recognized that without mixing bins or some similar device it is often impossible to prepare coal of uniform quality for the market. Two samples taken from different parts of the same railroad car load may vary 300 deg. F. in temperature of ash fusion.

The usual aim in cleaning is to retain all coal under a certain limiting specific gravity and reject the rest. It may happen that for a short time all or nearly all the coal after washing will be just under the limiting density chosen, and so all of it equally at the maximum permitted ash content which is satisfactory to the consumer only if it is tempered by lower ash coal. Such fuel will burn slowly; its lighted masses may choke and die in their own ashes and give insufficient heat.

W. E. Foulke, director, minerals separation division, E. I. du Pont de Nemours & Co., suggested at a meeting of the Anthracite Section of the American Institute of Mining and Metallurgical Engineers, Oct. 15, of last year, that coal should be washed at two gravities, so as to produce a low-ash and a high-ash, but acceptable, coal and then that the two should be mixed methodically so as to produce a medium-ash fuel, not all low-ash nor all high-ash. This point of view received favorable comment at the meeting.

With use of central breakers throughout the anthracite field came the need to size roughly and even clean roughly the coal at the point of origin before further transportation. Some of these auxiliary breakers are of more than ordinary size. At a Philadelphia & Reading Coal & Iron Co. operation, the coal is brought about a mile to the dump, where it is passed over a screen with 4¼-, 4⅛- and 3¼-in. perforations and what does not pass through the 4¼-in. screen goes over a picking table, where coal and bone are removed by hand and dropped down a chute.

The coal passing through the main screen is rescreened below with

New Anthracite Preparation Facilities in 1938*

Coal Company	Plant Location	Capacity, Net Tons of Feed per Hour	Preparation Equipment
Alden Coal Co.	Alden Station, Pa.	250	Chance [1]
Anthracite Coal Co. of Pittston	Pittston, Pa. (8)	980	Menzies [2]
S. W. Blakeslee Co.	Branchdale, Pa.	30	Wilmot [3]
Cranberry Improvement Co.	Hazleton, Pa. (4)	.....	Deister Conc. [5]
DeAngelis Coal Co.	Carbondale, Pa.	250	Chance [1]
Glen Alden Coal Co.	Ashley, Pa. (14)	1,400	Menzies [2]
Jermyn-Green Coal Co.	Plainsville, Pa.	.....	Deister Conc. [5]
Lehigh Navigation Coal Co.	Lansford, Pa.	16 [4]	Deister Conc. [5]
Lehigh Valley Coal Co.	Hazleton, Pa.	30	Wilmot [3]
Manbeck Coal & Ice Co.	Auburn, Pa.	12 [4]	Deister Conc. [5]
Moffat Coal Co.	Taylor, Pa.	110	Menzies [2]
Stevens Coal Co.	Trevorton, Pa.	150	Wilmot [3, 6]
Supreme Anthracite Coal Mining Co.	Peckville, Pa.	175 80	Chance [1] Menzies [2]
Susquehanna Collieries Co.	Mt. Carmel, Pa.	50	Wilmot [3, 7]
Volpe Coal Co.	Pittston, Pa. (2)	190	Menzies [2]
Wolf Collieries Co.	Oneida, Pa.	30	Wilmot [3]

* Also includes rebuilt plants and major installations of preparation equipment in existing structures. Where information as to the number of units installed, if more than one, is available, the number appears in parentheses after the plant address.

[1] Chance sand-flotation coal-washing equipment. [2] Menzies cone-separator coal-washing equipment manufactured by the Finch Mfg. Co., except for the Glen Alden Coal Co. units, fabricated in its own shops. [3] Hydrotator coal-cleaning equipment and auxiliaries. [4] Washed-coal capacity. [5] Deister-Overstrom "Diagonal-Deck" coal-washing tables. [6] Including Wilmot jig equipment. [7] Including Hydrotator classifier; capacity is given in terms of washed coal.

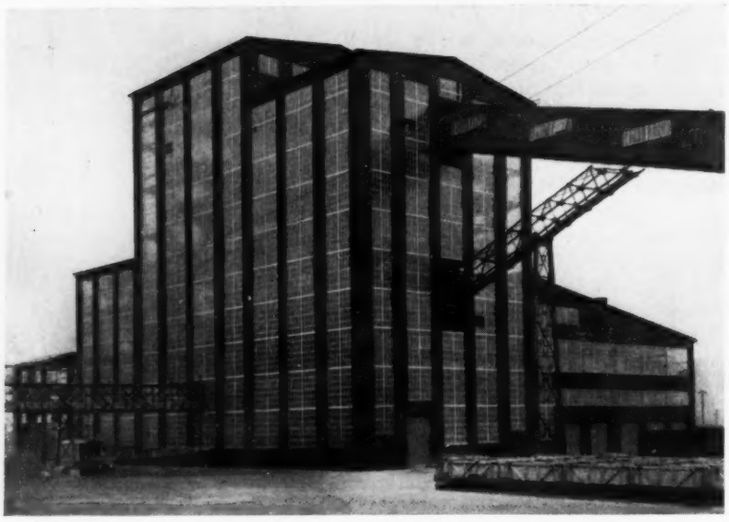


Fig. 1—Huber breaker, Glen Alden's impressive structure to clean 1,400 tons each hour of the day.

shaker screens that separate 1¾-in. and ¾-in. from smaller coal. Plus 4⅛-in. coal goes to a McLanahan & Stone No. 2 crusher—a single-roll unit crushing against a plate—which reduces it to stove and smaller. Springs are provided that afford accommodation should hard pyrite or tramp iron be encountered. The crusher can be adjusted while running so that it will crush to other sizes should the coal received run small. It is driven by a motor so balanced as to increase belt adhesion should the crushing duty require it.

The 4⅛x3¼-in. coal goes to a No. 4 crusher and this reduces it to stove, chestnut and smaller. A No. 6 crusher reduces the 1¾x¾-in. to pea coal and smaller. The product of the No. 4 and No. 2 crushers, both standard double-roll units, goes to No. 6 crusher. These crushers can be adjusted as to size of coal produced but not while running. The coal thus roughly cleaned and sized runs to a bin and is taken by belt to the main belt of the St. Nicholas breaker.

Handling of refuse is a major problem in the anthracite region. At the new Huber breaker of the Glen Alden Coal Co., an aerial tramway will dispose of breaker slate; perhaps this will be the first to be used in the anthracite region to handle such refuse, though aerial disposal of ash from boiler plants has been provided in the Southern Anthracite Field.

In the Panther Creek Valley, locomotives have been used to haul 30-cu.yd. cars of refuse to the dumping grounds between the several collieries, and all went well so long as there was room for more refuse. The locomotives could not haul the cars up a gradient exceeding 3½ per cent. After all advantage had been taken of the possibilities of using such gradients, 9-cu.yd. Linn tractors were introduced for this service at Greenwood colliery. As these proved to give satisfactory service, two 12-cu.yd. tractors of the same construction were provided, each holding 14 cu.yd. when piled, or 22 tons per truck. These units travel readily up the 10-per-cent gradient they have constructed by dumping and thus are able to dump rock over the points reached by the former 3½-per-cent gradients. The maximum depth of fill will be whatever will be attained by extending the present dump at an 8-per-cent gradient. By the use of the tractors, dumping area is economized and the heavy cost of blocking up and maintaining the track is avoided.

On the way from the breaker to the maximum depth of dump, plenty of width is provided for a permanent road, but care was taken not to fill the available space completely in case either of the tractors should have to be laid off for repair, in which case by dumping along the side of the road the one tractor could shorten its haul and thus handle twice as much material. The trucks have diesel engines and end dumps; the rear end is caried on a caterpillar. Sometimes the softening of the slate makes the road somewhat weak, and ashes have been placed for distribution if needed. Some of the rock is an excellent road metal that nothing will feaze.

The conical pile with a track up one side is somewhat typical of the Northern Anthracite Region; and on such a pile the Hudson Coal Co. has been using recently a movable track which is slidden over the main track of the dump and secured so that cars to be dumped can be drawn one by one upon this sliding track and dumped so as to provide width, extension and stability for the main track. Timber anchors thrown over the top of the dump and covered with refuse are roped to the ties. The cars are automatically dumped by the compressed air from a cylinder that charges itself automatically at the foot of the incline (*Coal Age*, September, 1938, p. 47).

Water problems continue to perplex the coal companies, especially in the Northern region, where the coal dips reach at Wilkes-Barre a depression of 1,150 ft. below sea level. The quantity of water stored underground is about 6¼ billion gal., almost as much as came in during the flood of 1937, when 10 billion gal. entered the Kehoe Berge and later the Pittston properties. Maps are being made on a scale of 400 ft. to the inch, and it appears that several pillars hitherto believed to be solid are punctured in places. The waters are gradually so completely filling some abandoned mines that they are about to overflow into working mines, which hereafter may have to handle all the water from both sources unless the Federal or State Government, to keep miners employed, undertake the job.

Match Power to Demand

In some mines transmission facilities designed originally to supply power only to the haulage system are proving entirely inadequate now that coal cutters, shaking chutes and loading conveyors have to be driven. Hence larger feeders, heavier trolley wire and line equipment have been installed. Automatic reclosing circuit breakers are on the increase, especially for direct-current transmission in large mines having several levels. Because of their application, the voltage is kept more closely to normal and power demands are improved.

In stripping of coal and for the loading of coal stored on the surface, the advent of the new type of scrapers, which not only scrape but lift, transport, dump and level the material handled, has displaced a number of draglines, and yet has so prepared the ground for the latter working on material and under operating conditions suited to their characteristics that further dragline activity may be expected. The anthracite region is so covered with glacial drift, which must be removed

before the coal can be mined or even found, that it is well fitted to the operation of these scrapers. However, as they use rubber tires, which are cut readily by hard rock, especially under the heavy loads which the scrapers can carry, they are not used for the removal of anything but surface material. The scraper has a much greater radius of action than the dragline, but it cannot send the scraping element beyond the power unit as the dragline can, nor work below the level on which the power unit stands.

Scrapers serve also to provide space on which the dragline later can place spoil. Often by the time the covering has been removed by a dragline, the machine has surrounded itself with artificial hillocks which, unless reduced by bulldozers, greatly restrict any further activity. The transporting scrapers described do the combined preliminary work of a dragline and bulldozer or trucks and leave the coal seam bare for dragline exploitation.

In exemplification of this, at Ralph W. Cohoe's Westwood colliery, near Tremont, Pa., a LeTourneau 13-cu.yd. Carryall pulled by a Beckwith RD8 caterpillar tractor is taking 30 to 35 ft. of glacial drift off the outcropping of the Mammoth coal, which here dips toward the north with an inclination of 65 to 75 deg. According to Rodney Artz, manager of the stripping, it takes off the cover at a cost one-third as much as if the 2-cu.yd. dragline were used and it puts the spoil so far away that future operations will not be restricted.

Loads, Totes, Dumps, Levels

On the tractor is a hoist connected by a coupling with the driving mechanism. This, through a rope, hoists or lowers a wide blade on the Carryall, which during the loading operation slices material off the floor of the cut and forces it into the wagon bed. The hoist also lowers a gate in front of the wagon so as to force the excavated material, and with it the back plate of the wagon (which has been slidden forward), to move backward until a full load is obtained. In discharging the wagon, the gate is lifted by the hoist to let the material out, and the back plate is moved forward like a big piston to sweep the wagon clear of material. The unit smooths dumped material behind it, leaving an even and solid terrain.

For the removal of the coal and of the rock which falls in the course of its excavation, a 2-cu.yd. Osgood dragline with 65-ft. boom is used. The intervals between the three or four splits of the seam break down readily, and this rock is lifted out of the pit by the dragline. Thus, the hole becomes large enough to permit the dragline to reach the coal at low levels. In November of last year, the scraper of the unit was working 93 ft. below the footing of the dragline and, as the unit was standing on the edge of the outcrop and the glacial drift was 55 ft. thick at that point, the total depth was 150 ft. In some places near by, the drift is 65 ft. thick.

Greater recovery depths could be attained by use of a clamshell bucket, which would not turn over as disconcertingly as a scraper; hence, the coal will be shot and a 2½-cu.yd. clamshell bucket used to lift it out of the hole. This is believed to be an innovation in stripping. At another location the Carryall was used to remove 5 ft. of glacial drift, all that was left uneroded at that point, and a 2-cu.yd. Osgood dragline was about to dig away the outcropping coal.

Many Carryalls have been used for anthracite stripping, among others by the Correale Construction Co., at Hazleton, Pa. Frank A. Hill, of Orwigsburg, Pa., has two Beckwith D8 tractors and two LeTourneau scrapers working at a stripping; the Kingston Contracting Co., of Luzerne, Pa., has one such combined unit working partly on stripping and partly on the removal of a colliery-rock refuse-bank and the Dick Construction Co. of Hazleton, Pa., has a 75 tractor and LeTourneau scraper working by turns on stripping work and silt-bank removal.

On culm-bank recovery projects the Ashland Machinery Repair Co., of Ashland, Pa., has a D8 tractor and a Carryall, and D. A. Kessler, of Mount Carmel, Pa., a similar outfit and also a 75 tractor with a LaPlant-Choate C7 scraper. The Kessler Carryall is a U-12 cu.yd. averaging nine pay yards per load and twelve loads per hour over a 500-ft. one-way haul. A million yards is to be moved. The LaPlant-Choate unit is operated by hydraulic means and has only two wheels, of balloon-tired construction. Roughly speaking, it is shaped like a bowl which, by the action of a hydraulic piston at the bowl top, is opened at the bottom like a clamshell. The lip of the clamshell, which faces forward and digs the material, has an edge with short integral teeth to make it cut into the material more readily. These scrapers dump to the rear and thus can be made to discharge after the equipment has been backed to the edge of a fill. A D7 tractor and 8-cu.yd. Carryall are being used by Gene Gasparine, of Jessup, Pa., on culm-bank reclamation.

From the little bulldozer of earlier years has sprung a fearful progency of giants ready for almost any kind of service around strippings, and anthracite strip pits and culm banks are taking full advantages of these developments. One of the many new anthracite combinations, a Caterpillar Tractor Co.'s diesel D4 tractor with a LaPlant-Choate bulldozer scraped up for Volpe & Daly what remained of a rib of anthracite in a 40-ft. cut where the dragline failed to scrape the coal. This machine uses 1 to 1½ gal. of oil per hour.

During the year the Glen Alden Coal Co. completed the hoisting provisions at the main Askam shaft, which lies between Truesdale and Loomis collieries. This shaft and its headframe are absolutely fireproof except for shaft guides.

Fig. 2—Tractor and lifting scraper removing culm at Centralia collieries.

BITUMINOUS MINES

+ Drive for Efficiency on Many Fronts

COORDINATION of men and machines is still the key to successful operation. This is a job of management. Since coal mining is fundamentally a transportation process, the job here is one of coordination to insure the maximum of uninterrupted flow of material from face to tipple. This means constant study of man power, methods, equipment and materials. With competition tougher day by day, the demands upon managerial ability in this field are steadily growing. And, as the record of progress for 1938 shows, the search for means to improve coordination and so lower production costs has turned the spotlight on every phase of the operating and supply cycles.

When Bits Dull Quickly

Hardly any feature can upset the orderly operation of the loading sequence more fatally than a failure of the cutting machine to fit in with the cycle or to be available when needed at the face to cut its kerf. The main weakness which prevents cutters from complying with a schedule is the dulling of bits and the frequency of the need for their resetting. When the coal is hard and contains pyrite or spars, the "one-time bit," that is used to cut only a single face and then is thrown away, has preference at many mines; those of the Peabody Coal Co., for example, and some of the Utah mines have discarded the 1½x1-in. bit steel that had to be resharpened repeatedly by mine blacksmith or pick sharpener. Some, however, who are using such bits prefer to sharpen them a few times before discarding them.

Because of hard material in the bottom of its coal, the Buckskin Coal Corporation, Buckskin, Ind., is using Cincinnati "Duplex" chains and bits, the bit points being made by cutting obliquely across a straight piece of bit stock. This change raised the output per pick point from ½ to 1½ tons. At Crownhill No. 6, Clinton Coal Co., Clinton, Ind., where the clay is cut under the coal, Prox "Tool Steel" and Bowdil chains and bits are used, increasing output per pick point from 1½ to 3 tons.

At one of the mines of the McAlester Fuel Co., in Oklahoma, Universal Goodman shortwall machines are cutting straight across 60-ft. faces in rooms driven straight up a 28-deg. pitch and appear likely to work satisfactorily and economically under the difficult conditions. At the mines of the Northwestern Improvement Co., at Roslyn, Wash., six shearing machines have been put in operation. Four shortwall machines were added last year at the Micco mine of the West Virginia Coal & Coke Corporation as part of a program for developing the mine for conveyor mining.

Interest has been aroused in the use of a hydraulic snubber which has been breaking down coal at the Buckhorn mine of the Consolidated Coal Co., Herrin, Ill., for a period of nine months. It has a rubber tube incased in a woven sheath which is placed in the borehole. In one minute a 7½-hp. pump puts a pressure of 2,500 lb. per square inch on the water, expanding the rubber tube through a flexible pressure hose and forcing down the coal by which the tube is imprisoned. In the same mine, where Airdox is being used, the air is piped into the rooms instead of being generated, as is customary, by a compressor at the face.

Coal to be mechanically loaded at Naomi mine of the Hillman Coal & Coke Co., in Pennsylvania, is being forced down by Cardox. The McAlester Fuel Co. expects to use the same expansion medium in the future, and at the Dines mine, Rock Springs, Wyo., where the Colony Coal Co. is mining a friable coal, Cardox has been introduced to prevent degradation. Heavy steel shells with black blasting powder are being used by the Norton Coal Corporation, Nortonville, Ky., to protect the coal against undue shattering.

To increase tonnage, the Talleydale plant of the Snow Hill Coal Corporation arranges to store the coal from an upper seam in a 1,500-ton bin lying between the two seams. Coal originating in the upper seam is hauled only during the night. The New Hope mine of the Linton-Summit Coal Co., Linton, Ind., has a similar problem but it connects its two seams with a 1,950-ft. rock tunnel on a 5-per-cent gradient down which the coal in cars is lowered by a locomotive. The upper seam is worked only by night and the lower seam only during the day.

Railroading Below Ground

In many mines an effort is being made to decrease gradients by blowing down the roof and lifting the bottom so as to make one good road, even where room headings must be allowed to remain nearly as irregular in profile as the mine floor originally was laid down. Thus at Bergoo (W. Va.) mines Nos. 2, 3 and 4 of the Pardee & Curtin Lumber Co., much grading was done to reduce abrupt changes of gradient that derail cars, injure men and destroy track. So also the Hillman Coal & Coke Co. has been improving its main-line haulage roads, recognizing the long period they will have to be operated. The Allegheny River Mining Co. likewise has been improving its main-line tracks. Particularly in slopes are even gradients desirable. At the Praco mine of the Alabama By-Products Corporation, a dip was taken out of a slope to make a safer and more efficient haulage.

At Bergoo also, heavier steel and treated ties have been installed on main tracks. Two miles of heavy track on treated ties has been laid for inside main haulage by the American Rolling Mill Co. At the Micco mine of the West Virginia Coal & Coke Corporation, 6,000 ft. of 60-lb. rail has been laid as permanent haulage track, because the improvement was recognized as a definite necessity in the plan to mechanize loading at that mine.

Specifications in car construction took a violent jump ahead in 1938 when the Isabella mine of the Weirton Coal Co., in Pennsylvania, introduced 182 ten-ton capacity eight-wheel steel cars (up to that time the largest below ground in any United States coal mine) (*Coal Age,* July, 1938, p. 61). Average pay load is 9.2 tons, though sometimes the weight carried exceeds 10 tons. The cars will carry 12 tons of slate safely. As they are 15 ft. 10½ in. long and have four spring-mounted flexible trucks and spring-and-friction-type draft and buffing gear, they ride smoothly. Yet, being of "axleless" type, they will turn in 25 ft.

15-Ton Bottom-Dump Cars

Before the public could get its breath, along came the 15-ton Sanford-Day bottom-dump cars at the Buckhorn mine of the Consolidated Coal Co., Herrin, Ill., which hold 10 tons water level and 15 tons with 10-in. side boards, 21 ft. long, 7 ft. wide and 54 in. high. These, however, are shuttle cars, traveling only between slope belt and mother belts and do not go to the face.

Car construction made a definite step forward with the application of Bendix hydraulic brakes to 125 Bethlehem Steel swivel-coupled cars for use at Bergoo. These are said not only to control the cars with certainty but also to save 260 lb. in weight.

Extra-strong 4-ton cars have been designed and 100 installed at the mines of the Shannopin Coal Co. (a Vesta Coal Co. subsidiary). They are of composite construction, of rotary-dump type, with spring bumpers, hand brakes and hand couplings and J & L copper-bearing steel throughout to resist corrosion. Because of their strength they can be handled safely in trains containing 120 to 130 cars. At the Bradford mine of the Alabama By-Products Corporation, Dixiana, Ala., where the coal is about 26 in. thick, 50 additional modern steel cars of increased capacity have been installed to replace old wood cars of smaller capacity, making a total of 150 steel cars already in service. This substitution will continue as the old wood cars wear out. Taking a leaf out of railroad practice, car weights have been reduced in some instances 25 per cent by use of improved floor plates, wheel hoods, sides and end plates, lightening the burden that the locomotives must drag around the mine.

Growing needs at Vesta mines Nos. 4 and 5 have made necessary the installation of eight 8-ton gathering locomotives. Other companies noted as adding to their electric haulage equipment include Clover Splint Coal Co., Closplint, Ky., and Dale Coal Co., Ravensdale, Wash. Larger and faster locomotives have been installed by the Colorado & Utah Coal Co. at its Mount Harris (Colo.) mine. Perhaps the most notable developments in haulage during the year were the gathering and swing locomotives at Isabella and the use of tandem locomotives at Omar No. 5 of West Virginia Coal & Coke Corporation (see p. 65).

With a new device, "the Davies safelectric" trolley-pole control, trolley poles are held down automatically when the trolley leaves the wire so that poles are not broken, wires torn down or men injured. Mine managers are beginning to realize that, unless headwork is used, the most destructive road to mine locomotives may be one with an even gradient. If the locomotive is provided with all the cars it can pull, it will heat on a long even run, whereas, with a broken inclination, the number of cars would have to be cut down or the locomotive would fail to drag them up the heavy gradients, and the locomotive would then use no more power on the adverse parts of the road and have time to cool off on the lighter or favoring inclinations.

For the men to enter and leave the working at Kings Station mine of the Princeton Mining Co., Princeton, Ind., a standard hoist in the 460-ft. escape shaft has been fitted with self-service features, so that the men can operate the hoist as on a self-service elevator (*Coal Age,* September, 1938, p. 51). At No. 3 mine of the Northwestern Improvement Co., Roslyn, Wash., a 300-hp. double-drum hoist has been installed to handle all coal in the synclinal basin and a single-drum inside hoist of equal power has been located at the

After an unstaged explosion. But for the Jones barriers and the explosion occurring at night the papers might have had a front-page story.

Rock dust, heavy track and steel crossbars notched into ribs eliminate explosions, lessen darkness hazards, reduce haulage casualties and decrease frequency of accidents from heading roof falls.

mine of the Dale Coal Co., Ravensdale, Wash.

The drive against excessive ventilation costs and outmoded installations which started a few years ago continued throughout 1938. Everywhere efforts are being made to cut costs and decisions are wiser now than in earlier years. Either new fans are being fitted to old mines or old mines to old, or even to new, fans, for some companies, realizing that the mine is partly at fault, revamp it when putting in a new fan or put the fan at a new point which shortens air travel.

At the mines of the Hillman Coal & Coke Co., aircourses have been cleaned with mechanical loaders, and at the old and extensive No. 5 mine of the Vesta Coal Co. a Jeffrey Aerodyne—a No. 8 fan of 128-in. diameter—has been installed to provide 50 per cent of the ventilation required by the mine, but it will take a larger and larger percentage of the load, gradually reaching eventually 75 per cent as development advances and additional duty is apportioned to the new fan. The fan has a capacity of 350,000 c.f.m. but it will deliver 220,000 c.f.m. of air at an efficiency of 80 per cent with a ventilating pressure of 3½ in. of water.

Because an old fan at the mine of the West Virginia Coal & Coke Corporation at Norton, W. Va., is inefficient and expensive to maintain, a new propeller-type fan with adjustable blades is being installed to be driven by an a.c. motor through a short-center V-drive. At the Brilliant mine of the Kemmerer Coal Co., completed in the latter part of 1937, a 7-ft. two-stage Aerovane fan was stationed at the top of a 160-ft. shaft, the upper 80 ft. of which was lined with a circle of steel instead of concrete. Additional fans have been installed by the Dale Coal Co., Ravensdale, Wash., not to meet present demands but to provide additional air when levels are opened at greater depth.

At the Kramer mine of the Northwestern Mining & Exchange Co., Stump Creek, Pa., an auxiliary 200-hp. 6-cylinder Wisconsin engine, 1,200 r.p.m., has been connected through a Philadelphia speed reducer with a ratio of 2.1 to 1 to the main fan, which delivers 260,000 cu.ft. of air at a 2.6-in. water gage. The fan is connected through a hollow shaft, 7½ in. in outer diameter, through which a smaller solid shaft runs. The 90-in. fan pulley is keyed to the hollow shaft and the shaft of the fan is connected by a flexible coupling to the solid shaft. A Hilliard overrunning clutch connects the solid and hollow shafts at the opposite end of the fan shaft. Thus the auxiliary drive is disconnected from the fan shaft when the main drive is running but picks up the load in motion when power is cut off the motor of the main drive. The latter can be started also so as to pick up the load when the auxiliary drive is actuating the fan.

With a seam only 4 ft. 8 in. thick, the Shuler Coal Co., Iowa, has found it necessary to increase its ventilating current by installing a Jeffrey booster fan. A reinforced-concrete overcast is now being completed at Stirrat No. 19 mine of the West Virginia Coal & Coke Corporation to bring the ventilation up to standard and to provide the air needed for future work.

In some sections it becomes almost impossible to take enough air into mines to keep the methane content down to a safe figure, and almost the only way out is to reduce the output of coal. In one mine, No. 34 of the Pocahontas Corporation, at Bishop, W. Va., the methane in the return was 1.5 per cent, and the problem presented was solved in an unusual way by sinking holes through the seam with a coal-prospecting drill (*Coal Age,* March, 1938, p. 70). Four holes discharge 600 c.f.m. in aggregate, which, if 1 per cent of methane were allowed in the return, would require for its dilution 60,000 c.f.m. of air. Thereby, the methane content in the return current was cut to 0.3 per cent. These holes would not have removed much methane if the workings had not released the water, for two other holes were almost entirely sealed in that manner and produced little gas.

During the year it was advocated that fans be located at the bottoms of shafts, each for one or more of the several air splits, so that each fan could be designed for the needs of each split or combination of splits and to overcome some of the air losses in the shaft (*Coal Age,* May, 1938, p. 83). In such case a large fan should be kept or be erected at the surface ready to replace the other fans, if an explosion should occur.

Two Victims of the Flood

The two biggest mine pumping projects of the year were those of the mines of the Sahara Coal Co., at Harrisburg, Ill., and the Commodore Coal & Coke Co., at Oliver, Pa., where in each instance 3,000,000,000 gal. had entered the mines to be pumped out by deep-well units. At last reports, neither was in operation.

Some of the concentration so helpful in other branches of mining often can be applied to pumping. Two permanent pumping stations, each having a capacity of 500 g.p.m., were installed underground in Omar No. 5 mine of West Virginia Coal & Coke Corporation. The pumps are driven by a.c. motors, and the water is delivered to the surface by cased boreholes. The installation of these two pumps and of a similar pair in the latter part of 1937, eliminated the use of several gathering pumps and released a large pipage which is being salvaged and used on other pumping jobs.

Similar concentration occurred at the mine of the Alabama By-Products Corporation at Praco, where a 2,000-g.p.m. pump with a borehole

to the surface eliminated several smaller units. For drainage of its minor swamps the Clearfield Bituminous Coal Corporation provided a number of gathering pumps of from 20 to 50 g.p.m. capacity with V-belt drives. Being compact and of light weight, they were found well suited to such service. Other installations that might be instanced are a new 500-g.p.m. pump at the Summit mine of the Alta Coal Co., Sumiton, Ala., an additional 100-g.p.m. pump at No. 3 mine and a 500-g.p.m. unit at No. 5 mine of the Northwestern Improvement Co., at Roslyn, Wash., and additions to pumping facilities at the mine of the Dale Coal Co.

Practically all the water made in a 48- to 60-hour period by the extensive Oakmont mine of the Hillman Coal & Coke Co., Barking, Pa., can be held by a large sump excavated during the past year. A borehole has been drilled to it, and a centrifugal pump has been installed of sufficient capacity to remove all the water in a single shift. By some ditching and cleaning, two small pumps were eliminated and, because of the location of the sump and the use of the new pump, it has been possible to dispense with four main pumps and their attendant labor. One man now handles the water on one shift at a period during the night when the operation of the pump does not increase the billing demand; thus this investment should show a quick return. At the Emerald mine of the Emerald Coal Co., at Clarksville, Pa., a similar installation was made and is now in operation.

Town Water Held in Mine

At Lynch, Ky., the United States Coal & Coke Corporation has provided 200 acres of room workings in No. 30 mine and 60 acres in No. 31 mine as reservoirs for water derived from two boreholes sunk in Big Looney Creek through the roof of the mine. The room necks are dammed and the water is transported by pipes from the nearest rooms to a station outside the mines where it is clarified by about 125 lb. of iron sulphate and 150 lb. of lime a day added by three "dry-feed" machines—one for sulphate, one for lime, and one for either as desired.

Ebonol paint coatings are still doing good work for the McAlester Fuel Co. in the protection of the mine roof, and their use will be extended in the future. At Nellis, W. Va., the Nellis Coal Corporation has provided a self-propelling compressor to furnish air for drilling holes preparatory to shooting slate.

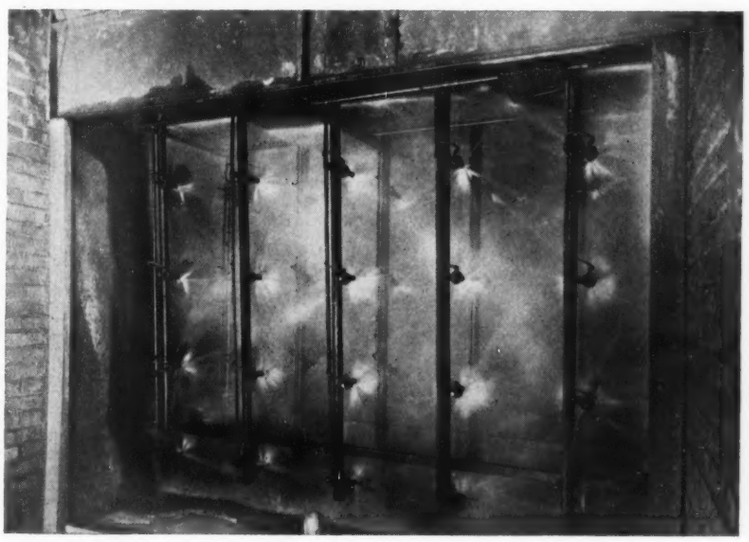
Four-inch aluminum H-beams, 20 ft. long, at 5- to 6-ft. centers, with 4-in. box steel telescoping extensions 4 ft. long where needed to complete the support of the full width of a room, are being used by the Pittsburgh Coal Co. at Warden mine, with 2-in. double-strength pipe, 10 ft. long, extending as forepoles from the beam through 2½-in. holes drilled in the coal to points beyond the undercut (*Coal Age*, March, 1938, p. 80). Sometimes three beams at 7-ft. centers are used at one time. When thick slate is supported over the gob, 5-in. aluminum H-beams 28 ft. long are set temporarily along the gob line. Such beams, but 22 ft. long, are used to support the roof over maneuvering mobile loaders.

Air, as it enters mines in warm weather, cools, becomes supersaturated, and deposits water on the mine surfaces. If sprayed with cold water, it does precisely the same, but can be made to drop the water on eliminators. The air, thus relieved of entrained water, nevertheless is completely saturated but no longer deposits dew. It will, however, dampen most rocks a little, but far less and more slowly than if supersaturated. Sprinkling the air with sprays from 224 nozzles at the Talleydale mine of the Snow Hill Coal Corporation, near Terre Haute, Ind., stopped the roof from falling, either by drying the air or by preventing changes of temperature or both (*Coal Age*, April, 1938, p. 47). The liquid moisture is removed by 250 eliminator elements. Similar installations have been made at the American No. 2 mine of the Knox Consolidated Coal Corporation, Bicknell, Ind., where the fan and sprays are located on the bottom and mine water is used for cooling, and at the Kings Station mine of the Princeton Mining Co., Princeton, Ind., where the water for cooling is itself cooled by spraying it into the return air (*Coal Age*, December, 1938, p. 64).

Last year the Vesta Coal Co. completed a ventilating and refuse-disposal shaft at No. 4 mine, California, Pa., 15 ft. 6 in. x 40 ft. 6 in. and 512 ft. deep, with two 600-kw. mercury-arc rectifiers, a hoist and two double cages. An airshaft 220 ft. deep was completed at Barney mine of the Alabama By-Products Corporation, Cordova, Ala. The fan was moved to the new location and the ventilation of the mine greatly improved. A new slope has been sunk on the McKay seam and new headframe erected by the Strain Coal Co. at Renton, Wash. The Dale Coal Co. prepared to sink shafts by the purchase of hoists and pumps for that purpose, and the Colony Coal Co., at Rock Springs, Wyo., built several tunnels in the rock to connect its three beds in the Megeath mine.

Few new safety provisions marked the year 1938; perhaps the most outstanding was that which was devised by J. E. Jones, Old Ben Coal Corporation, and used in the mines of that company in Illinois and by the Raleigh-Wyoming Mining Co. at Glen Rogers, W. Va. Bags of rock dust are placed each on a board near the roof of the mine. Under each is a vane which an explosion

Water sprays, like a cold atmospheric wave, cause warm air to give up its moisture in the form of rain. What doesn't fall to the floor is caught by eliminators. Cold water actually dries moist warm air.



will deflect, dislodging the board, and ripping the bag so that the dust fills the area, extinguishing the explosion, being spread by the pressure wave which precedes the explosion. An accompanying illustration shows how the new Jones bag-type rock-dust protective units look after having been actuated by the pressure wave generated by an actual explosion on Dec. 7, 1938, in the Old Ben No. 15 mine, West Frankfort, Ill. The units pictured were part of a group some 300 ft. or more from the point where the flame of the explosion died out. They were put up with the trigger mechanism originally developed for dropping the bags. This mechanism has since been succeeded by an improved type, as described in *Coal Age,* October, 1938, p. 40. The bag units, plus pressure rock-dusting, were credited with confining the explosion to a single panel and preventing its spread over a much larger territory.

High-pressure rock-dust machines have been installed at the Gibson mine of the Hillman Coal & Coke Co., Bentleyville, Pa., and at the Emerald mine of the Emerald Coal Co., its subsidiary, at Clarksville, Pa. The Peabody Coal Co. bought four M.S.A. stationary-nozzle high-pressure rock dusters, one each for Mines 30, 7, 8 and 47. The first three are equipped with 85-volt motors and they are to be driven by a storage-battery locomotive connected to the motor of the rock-duster through the controller, thus making it a more or less self-contained unit, eliminating the annoyances and delay of trailing cables. This has proved an advantageous method of construction and operation. At Nellis, W. Va., the American Rolling Mill Co. installed in the past year equipment for filtering and chlorinating the town water supply.

In Wyoming the big event of the year was the opening of the D. O. Clark mine of the Union Pacific Coal Co. (*Coal Age,* November, 1938, p. 44) and in Kentucky the construction of a new mine, No. 18 of the Stearns Coal & Lumber Co. at Blue Heron (*Coal Age,* November, 1938, p. 38). Much progress was made in the construction of the new mine of the Koppers Coal Co., at Kopperston, W. Va. The tipple began to load coal at the close of the year; it has a capacity of 400 tons an hour and if another seam is worked that capacity will be doubled. The first 100 homes have been constructed, 60 four-room structures and 40 five-room. Each home has a modern bathroom, hot-air furnace with electrically driven force fan.

In Illinois, the opening of Buckhorn mine of the Consolidated Coal Co., near Herrin, which sets new standards in mechanical loading, car capacity, belt operation, breaking down coal and delivery of supplies, was perhaps the outstanding event in underground operation. It has a slope which was driven mechanically and constructed under unusual difficulties of heaving bottom and sliding sides. In Ohio, the Pleasant Valley Mining Co. opened a new mine last year, starting to develop its bottom early in December. It is designed as a super-truck mine, a kind of construction sure to multiply, especially where, as at Massillon, where this mine is located, a large convenient market territory is available.

Other than the dwellings at Kopperston, little is to be recorded in the direction of new housing, but the Colorado & Utah Coal Co. records at Mount Harris the construction of modern houses, decorated throughout and including baths, closets and front and rear porches. In Praco, the Alabama By-Products Corporation erected a fireproof store with self-service and other modernisms. Personnel and industrial relations were studied intensively by the Hanna Coal Co. in 1938, in order to promote a more general feeling of well-being and greater efficiency, especially in regard to the men who operate machinery.

BITUMINOUS MECHANIZATION

+ Marks Up New Gains in 1938

ACTIVITY in the bituminous industry in the installation of equipment commonly included in the mechanization group was maintained at a relatively high level in 1938 in view of the 22½ per cent decline in production that year. Sales of mobile loaders, which approximate fairly closely the number installed, totaled 241 units last year, a decline of 17.5 per cent from the 1937 total of 292, according to data compiled by the National Bituminous Coal Commission and the Works Progress Administration (see p. 56 of this issue). Sales of conveyors, excluding conveyors in haulageways and slopes, aggregated 749 in 1938, of which approximately 10 per cent were purchased for use behind loading machines. Sales in 1937 totaled 835, making the drop last year 10.3 per cent. Pit-car-loader purchases rose from 32 in 1937 to 139 in 1938, an increase of 334.4 per cent. On the other hand, only six scrapers were bought by the industry in 1938, compared with thirteen in 1937, a drop of 53.8 per cent.

Assuming the increase in number of units to be nearly equal to sales, the following may be viewed as close approximations of the number of machines in service in the two major classes in 1938: mobile loaders, 1,470; conveyors, 2,700. In 1937, total mobile loaders in service is estimated at 1,250, and conveyors, 1,980. This compares with reported totals of 980 mobile loaders in 1936, plus 234 self-loading and 936 hand-loaded conveyors, or a total of 1,170 conveying units. Conveyor figures for 1936, however, are not exactly comparable to those in later years, due to difficulties in defining just what constitutes a machine of this type. As a result of the increases in equipment in service, including rises in the number of scrapers and pit-car loaders, if any, it is estimated that approximately 25 per cent of the deep-mined bituminous output was loaded mechanically in 1938, compared with 20 per cent in 1937 and 16.3 per cent in 1936.

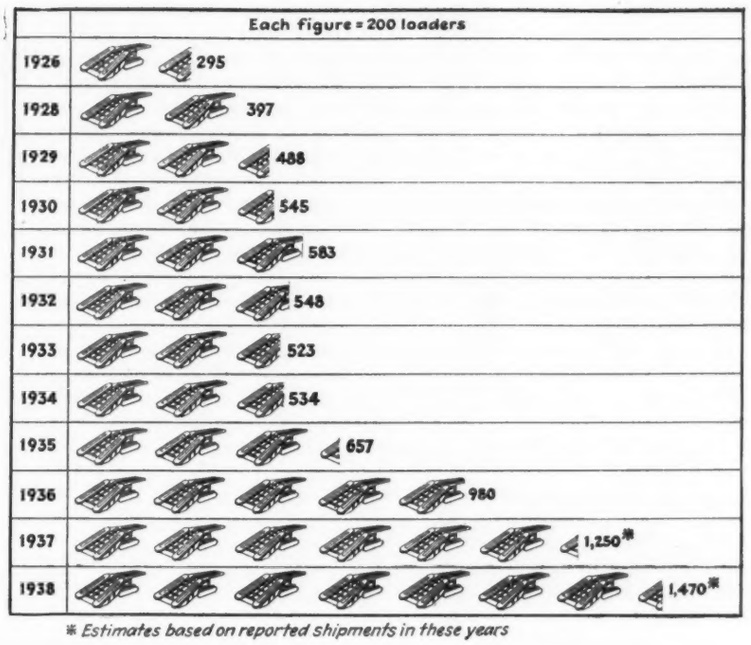
While conveyors held their posi-

tion in the thin-seam production group, the year 1938 was marked by additions to the list of mobile loaders in coal that heretofore might have been considered the sole province of the conveyor. And in the conveyor field, an increasing number of operators took advantage of equipment designed to make them self-loading, although hand-loaded types still were in the majority. Room-and-pillar systems of working were used by most operators in 1938, as in past years, with the addition of pillar mining in districts where this had been the practice in hand-loading days. In conveyor mining in the Appalachian district, the trend toward very wide rooms continued, but in spite of this there were very few new examples of what might be termed long-face mining in 1938. In a few cases, angle faces were used to increase the length. Where mobile loaders were used, however, even fewer attempts were made at long-face work, although some experiments were carried out to supplement long-standing examples.

Conveyor installations varied in type from single units, each discharging into a car, through two-, three- and four-unit systems, meaning that either two, three or four rooms, or more in a few instances, each with a conveyor, are driven abreast. In several instances, all the room conveyors discharged onto a mother belt. In others, cross conveyors carried the coal from the other conveyors to one unit which in turn discharged into a mine car. Provision always was made where possible, however, for loading cars in trips.

Loader Service Stressed

Where mobile loaders were in use, the subject of service to these loaders in order to keep them actually producing as much of the working shift as possible was approached largely, as in past years, by increasing car size. And where two gathering units were employed behind a machine, operators almost universally connected tracks through the crosscuts, installed two tracks in rooms, put in stub switches or adopted some other system of providing a switch close to the face so that one haulage unit, after storing its load, could stop there while the other unit was waiting for the car at the machine to be filled. Conveyors, particularly where the coal was thin, were used in increasing numbers behind loaders, and also were installed in some of the thicker seams—in one case in conjunction with the biggest cars yet designed for underground use.



* *Estimates based on reported shipments in these years*

Mobile loaders in use show another substantial gain in 1938.

Rubber-tired haulage units also went into additional mines in 1938. And, although locomotives were used in serving loading machines where special facilities were not installed, a number of operators found mules, ponies or horses acceptable for this service. These operators, in particular, concentrated on keeping sidetracks and changing switches close to the working sections and working faces.

Few departures from what might be termed standard face-preparation practices were observed in 1939, although the use of track-mounted cutting machines, particularly to accompany track-mounted loading machines, continued to grow. Cutting out bands and partings made further gains, and there was a noticeable increase in shearing, in many cases accompanied by special machines for this purpose. Deeper cuts were adopted by several companies in the past year, and many operators reported good results with low-pressure coal-breaking mediums, such as Cardox and Airdox, in pulling such deep cuts, particularly in thin coal where there was a considerable unbalance in burden on the holes. Caterpillar trucks for moving cutting equipment in trackless mines made further gains in 1938.

Among those companies adding to shearing equipment was the Northwestern Improvement Co., operating in Washington, which installed six machines in 1938 and also placed twelve additional shaking conveyors in service. In the same State, experiments with shaking conveyors were carried on at the Glen Echo mine.

Utah, with many of its thick-coal mines long mechanized, made still further progress toward the goal of complete machine loading in 1938. In addition, operators actively pursued a policy of replacing smaller-capacity loaders with higher-capacity machines, supplementing this with the adoption of new methods or the tightening up of old to get a substantially higher output per machine shift. The Columbia Steel Co., as an example, started 1938 with a completely mechanized set-up, replacing old-type loading machines, supplemented by hand loading and also old-type cutting machines, with four Jeffrey L-400 track-mounted loading machines, two Jeffrey 29-U track-mounted cutting machines and two Jeffrey 56-A double-spindle track-mounted drilling machines. Auxiliary equipment included enough new gathering locomotives to give each loading machine two, 100 new 6-ton mine cars, additional d.c. conversion equipment, etc. The new set-up is designed for an output of 1,600 tons in seven hours from coal 11 to 12 ft. thick on a pitch of around 12 per cent (*Coal Age,* November, 1938, p. 29).

Another of the Utah companies going to larger loaders was the United States Fuel Co., which has in service six Joy 11BU units. Sufficient Sullivan 7-AU cutters were added to the CLU equipment on hand to make cutting 100 per cent

track-mounted. Additional mine cars also were purchased, as well as additional locomotives (Edison storage batteries) to give each loader two.

But mobile loaders in high coal were accompanied by an extension of the use of conveyors and Cardox in thin (under 4-ft.) beds of clean coal under good roof, in many cases in competition with mobile loaders in thick coal. Cardox permits breaking coal down during the day, as shooting with powder on the working shift is prohibited in Utah. At one mine in high coal (over 12 ft.), Goodman duckbills were being used in mining pillars after the rooms were driven. And in coal 5 to 7 ft. thick, the Liberty Fuel Co., among other users of conveying equipment, employed the two-room system: i.e., two rooms, each with a shaking conveyor discharging into cars on a sidetrack on the entry, driven abreast. Vulcan of Denver equipment is employed, and the conveyors are hand loaded. A cover thickness of 800 ft. led to the decision to work only two rooms in a group and thus reduce the extent of the area open at one time. Pillars are mined by slabbing them on the retreat out of the rooms, and the coal is broken down with Cardox. Including one unit driving headings and necking rooms, five are in service, giving an average output of 500 tons per day (January, 1939, *Coal Age,* p. 43).

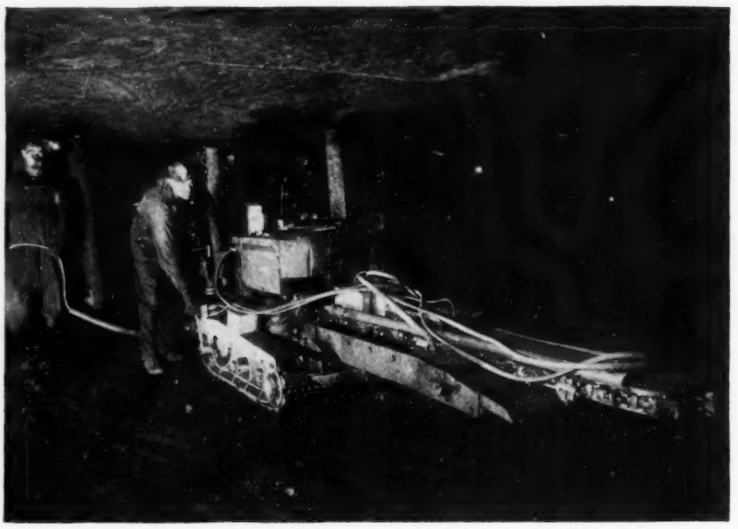
Equipment Types Varied

A variety of equipment also was called upon in Wyoming in 1938. At the new D. O. Clark mine of the Union Pacific Coal Co., for example, Goodman shaking conveyors equipped with duckbills load the coal into 4-ton cars. In addition, where conditions will permit, mobile loaders will be employed. The D. O. Clark workings (November, 1938, *Coal Age,* p. 44) are served by a Link-Belt four-section 48-in.-wide belt-conveyor system 2,600 ft. long with a capacity of 700 tons per hour. This system will take coal simultaneously from operations in five different seams. Dumping stations comprising rotary dumps and 25-ton receiving hoppers receive the coal and feed the belt system at locations in the Nos. 7 and 15 seams. At the Brilliant mine of the Kemmerer Coal Co., opened in the fall of 1937, chain-and-flight face and room conveyors were installed in a pitching seam, these conveyors in turn feeding to a mother belt which conveys the coal to a central car-loading point.

Colorado developments were featured by the adoption of conveying equipment by a number of operators, either new or additions, plus also additions to mobile-loading equipment where conditions permit the use of machines of this type. As instances, two shaker conveyors were added to the equipment at the Nonac mine of the Colorado Fuel & Iron Corporation, while the Colorado & Utah Coal Co. installed six new shakers at its Mount Harris mine, plus larger and faster electric locomotives. The new equipment at Mount Harris, plus power shovels and face-conveying units, brought the mechanically loaded tonnage up to 90 per cent of the total.

At the New Centennial mine of the Boulder Valley Coal Co., Lafayette, Colo., using hand-loaded shaking conveyors in 4- to 7-ft. coal, the operating practice was based on only one unit per room entry, this unit driving rooms and drawing back the pillars on the retreat (September, 1938, *Coal Age,* p. 36). Retreat operation with single shaking conveyors, but on a different order, characterized the work of the Gordon Coal Co., Walsenburg. Entries consist of three headings, which are driven to the boundary. One heading serves as the aircourse, another as an opening for loading cars in trips, and the third as a haulage road. Haulage and loading headings are connected by slants at frequent intervals, thus permitting free access to the loading stations while leaving the haulage road always clear. In retreating, a conveyor is started in the first of a group of rooms to drive them up and take out the pillars. At the proper distance away, a second conveyor is started in another group of rooms. When the first conveyor works up to the second, it "leapfrogs" it to another location on down the entry. Thus, several units may work on the same entry while still preserving the retreat principle (August, 1938, *Coal Age,* p. 68).

Some twelve to fifteen mines in the Southwest, particularly in Arkansas and Oklahoma, purchased room-conveyor equipment in 1938, mostly of the shaker type, many of them accompanying this move with the installation of Cardox for breaking down the coal. And in Arkansas, the all conveyor-mechanical loader mine of the Sunshine Anthracite Coal Co., west of Clarksville, began to hit its stride last year. All main-line transportation at this operation, in 36- to 41-in. coal containing a middle band which is cut out as the first step in its eventual elimination, is accomplished with belt conveyors, including a 600-ft. slope belt. Headings are driven by Joy Jr. loaders, which feed into Joy chain conveyors, in turn discharging onto the belt system. The production backlog, however, comes from walls 65 to 150 ft. long advanced with Joy chain conveyors and Joy regular face or portable conveyors. In wall work, two 65-ft. walls are started off the entry with a 15-ft. pillar between them. Each wall is served by a face conveyor and a main conveyor discharging onto a belt unit. When the walls have been advanced about 100 ft., the 15-ft. chain pillars between them are eliminated and one long wall is carried on, with one lengthened face conveyor and a main



Caterpillar transfer trucks facilitate moving cutters in a number of trackless mines or working sections.

conveyor, for another 100 ft. The place then is re-necked to leave small stumps and the double-length wall is advanced the remainder of the normal 300-ft. depth.

Another installation of conveyors in a longwall mine was that of the Old King Coal Co., near Centerville, Iowa, which started experiments with this equipment in 1938. In Illinois, mechanization of new mines and additions to equipment at old mines continued. The Superior Coal Co., Gillespie, as an example, mechanized its fourth operation last year, accompanying this move with a new preparation plant. Two new 11BU loading machines were purchased for the Zeigler No. 2 mine of the Bell & Zoller Coal & Mining Co. and another for Zeigler No. 1 mine. The Peabody Coal Co. acquired one Jeffrey L-400 loader for each of its Kincaid No. 8, Woodside No. 53, Capital No. 57 and Peerless No. 59 mines.

Conveyors Serve Loaders

The new mine of the Buckhorn Coal Corporation, near Herrin, Ill., another to adopt a slope belt to bring the coal to the surface, entered the operating phase in 1938, using Joy loaders served by room conveyors in turn discharging onto mother belts. From the mother belts the coal is run into drop-bottom cars holding 10 tons level full and 15 tons with sideboards for the final journey to the foot of the slope. Four rooms are operated as a unit. Loading is done in one, cutting and drilling in another, and shooting in the third, with the fourth providing an opportunity for taking up the slack in the various operations. Cutting machines are moved by caterpillar transfer trucks and the coal is broken down by air piped into the working places. In addition, experiments were carried out with a rubber hydraulic cartridge.

Late in 1937, the Wasson Coal Co. installed a dual-haulage system in its No. 1 mine, in Saline County, Illinois, to obtain the benefits growing out of serving loaders with big cars, and at the same time permit the use of the original cars—necessarily small because of the limitations of shaft size—for handling the coal between the working sections and the surface. The system (June, 1938, *Coal Age,* p. 33) was based on installing 4-ton drop-bottom cars, as compared with the 1½-ton cars already in service, which discharge into a hopper fitted with an elevating conveyor for loading the small cars in trips. Following this development, Wasson mechanized its "A" mine, in thinner coal, in 1938, using Joy 8BU loaders discharging into chain conveyors which carry the coal to the car-loading stations.

Indiana in 1938 was the scene of the fourth installation of the rubber-tired haulage equipment developed by James H. Fletcher. This equipment comprises Baker-Raulang tractors with Exide-Ironclad batteries pulling 4-ton Sanford-Day drop-bottom trailers. Five such units were purchased, with the idea of using two behind each of the 7BU loading machines in service in room work, with the fifth alternating between the two machines when the haul lengthens. These trailers dump into a hopper from which an elevating conveyor (Barber-Greene) runs up to a loading station where the original 5-ton drop-bottom cars are filled in trips of eight each (October, 1938, *Coal Age,* p. 29). Caterpillar-mounted transfer trucks are used for moving cutting equipment, and a modified "checkerboard" mining plan is employed to provide the maximum number of working places in a given territory and make the haulage as flexible as possible. The two loading machines, with the equipment outlined above and other auxiliaries, and a crew of 25 men, produce 900 to 1,000 tons of mine-run —delivered at the slope bottom—in seven hours.

Open Mines in Mines

Two new "mines within mines" were opened on a mechanical basis in Indiana in 1938. At the New Hope operation of the Linton-Summit Coal Co., a 1,950-ft. rock tunnel on an upward grade of 5 per cent was driven from the present No. 5 workings to the No. 6 seam 50 to 55 ft. above. As in the No. 5, the No. 6 coal will be mined with Goodman track-mounted loading machines discharging into the 4½-ton drop-bottom cars of the same type used in the No. 5 workings. Production from the No. 6 seam is expected to average 1,000 tons per day (two machine shifts), as compared with 1,700 tons (four machine shifts) from the No. 5. In addition to 260-A loading machines, New Hope also had in service in 1938 a low-type 360 machine which had handled as high as 655 tons in a shift.

Lying about 50 ft. above the No. 3 seam originally opened, the No. 4 coal at the Talleydale mine of the Snow Hill Coal Corporation, Terre Haute, Ind., will be recovered with Goodman loading machines and drop-bottom cars. The cars dump into a 1,500-ton bin excavated in the interval between the two seams, and from this bin will be fed on the second shift into the No. 3 cars for transportation to the shaft bottom, hoisting and preparation. Thus, coal will be mined in both the No. 3 and No. 4 workings on the first shift, but the preparation plant will be run two shifts, preparing coal from one seam on one and from the other on the second. In the No. 3 seam, with 5- to 6½-ft. coal, 5.8-ton mine-cars and a single locomotive behind each 260-A loader, output per machine-shift at Talleydale averaged 484 tons of mine-run in the first six months of 1938.

Already the home of one conveyor operation of several years' standing, Indiana got additional producing facilities of this type in 1938 with the installation of a Jeffrey four-room unit by C. J. Freeman at his mine at Glenn Ayr, a few miles east of Terre Haute.

Mechanization Moves Fast

Developments in western Kentucky, already the home of a rubber-tired haulage installation and some mechanization work with both loading machines and shaking conveyors, were featured by a rush for the adoption of mechanical equipment, particularly in the last six months of 1938. Thus, this district, the scene of some of the earliest experiments with mechanical loading years ago, becomes the newest recruit to the ranks of predominantly mechanized regions. Mobile-loading equipment included practically all sizes with the exception of the largest, with shaking conveyors as added starters. Transportation behind mobile loaders ran the gamut from battery tractors, installed in the Moss Hill No. 2 mine of the Hart Coal Corporation in 1937 (January, 1938, *Coal Age,* p. 47), on through conveyors and locomotives to mules and ponies, with the latter giving a good account of themselves in several mines.

New operations in western Kentucky in 1938 include that of the Crescent Coal Co., Bevier, in which, as at a few other operations in late years, a slope was driven with a loading machine preparatory to installing a belt and a hopper at the bottom for large drop-bottom cars. Loading will be done with 8BU machines serviced by room conveyors. Conveyors also are being used behind loaders in the Duvin mine of the Ruckman Coal Co.

A second Joy Jr. loader went into service at the M. B. Brown mine in December, 1938, mining 3- to 4-ft.

coal. Mules and ponies are used for car-changing, which is facilitated by a system of keeping changing switches usually not more than 75 ft. from the face, either by laying track through the crosscuts or, in rooms, by installing switches and stub tracks close to the face and moving them up at regular intervals. Production per man at this operation, excluding preparation but including supervisors and office men, as well as eight hand loaders engaged in mining out bad spots, is close to 10 tons per shift on the basis of average shipments of 385 tons per day. Taking in the preparation force, output per man-shift is around 8½ tons per shift.

The Norton Coal Corporation added an 8BU loader to the equipment at its Nortonville mine, and a 7BU machine at its Crabtree mine. Coal height at Nortonville averages 4½ ft., and the mine cars hold, mechanically loaded, 2,300 lb. The loading machine is double-shifted, filling empties on the second shift, during which no coal is dumped. Development is done with pit-car loaders. Numerous track layouts have been tried to speed up service to the loader, but best results have been obtained by carrying a double track in each room from a switch of special design kept, as far as possible, within 40 to 50 ft. of the face. Gathering locomotives handle the cars on the entry, but they are switched in the rooms by mules, the track layout providing the equivalent of a sidetrack in each place so that the loaded car has to move only about 30 ft. before an empty can be switched in to the machine. Under this system, the company reports an average of 200 or more car changes in seven hours.

Bigger Cars Adopted

Coal thickness at Crabtree is approximately 7 ft., and late in 1937 old 2-ton cars were replaced with units averaging 3½ tons mechanically loaded and over 4 tons when filled with pit-car loaders, used for development at this operation also. Until the end of the year, double tracks were maintained in each room, with mules switching the cars from the entry and feeding them to alternate tracks. But with a room width of 40 ft., it was found that the machine lost too much time moving from one track to the other, so it is planned to install the same track layout as is used at Nortonville, using one of the tracks ahead of the changing switch as a storage for several empties.

Face preparation at Crabtree has been given careful attention to reduce the output of fines and also eliminate a 3-in. "blue band" about 30 in. from the bottom. After being undercut, the coal below the parting is broken down, usually by barring if it does not fall of its own weight. Then the blue band is taken out to the back of the cut, along with several inches of coal which generally sets down with it. The bottom coal then is shot lightly, followed by the top coal. This method of shooting, it is reported, permits the entire face to come free from the roof and frequently turn entirely over. To reduce shattering to a minimum, black powder in steel shells is used. As a result of this method of handling, the proportion of fines has been reduced approximately 6 per cent.

Shaker conveyors were used by the West Kentucky Coal Co. and Dawson Collieries, Inc., in 1938. Ten Goodman units with duckbills were in service at the West Kentucky No. 8 mine, where coal thickness averages 4 ft. 10 in. Retreat work is the rule, and rooms are turned off an entry consisting of three headings. One heading is laid with track for loading cars in trips and the other with track for the haulage equipment, thus preventing interference. In retreating, one conveyor is started at the boundary and assigned a group of ten rooms, with the next starting at the eleventh room down on another ten-room group, working them out in order, etc. Thus, there is room between conveyor units for spotting a trip of cars. At the Dawson Collieries mine, a mother belt is used to gather coal from a Goodman shaker group, this belt discharging into cars for the trip to the slope leading up to the tipple on the surface.

Stock-taking was a feature of mechanization developments in many regions, and among the companies in this group was the Hanna Coal Co. of Ohio, which surveyed its experience over a period of years to find most of its practices to be correct but some to be revised. Considerable attention also was concentrated on the men who have to operate the machinery and work under the new methods of the past ten years. Little change was made in mine projections, a point being made of capitalizing on the production technique developed in connection with layouts and methods already in existence. Among the revisions was the initiation of a study of rubber-tired haulage, based on operation with actual installations.

Across the Ohio River in the West Virginia Panhandle, the Beech Bottom mine of the Windsor Power House Coal Co. was completely mechanized with twelve loading units, each consisting of an 8BU loading machine, a Goodman universal shortwall cutter with 8-ft. bar, a Chicago Pneumatic post-mounted drill, and a Jeffrey 6-ton cable-reel locomotive. The equipment is operated two shifts a day. Seam thickness is 4½ ft., and the coal is overlain by about 15 ft. of dangerous roof made up of slate, laminated coal and shale and 12 ft. of clay shale. Above this stratum is a massive limestone which bends but does not break when the coal is mined. Consequently, pillars are left in place. Headings are driven 10 ft. wide on 30-ft. centers. Rooms are driven 30 ft. wide on 40-ft. centers to a depth of 200 ft. The twelve mechanization units are divided into six groups, each consisting of one narrow and one combination narrow-and-wide unit. A face boss oversees each group. Rooms are driven in blocks of ten, leaving a solid pillar 50 ft. thick between each pair of blocks as an additional roof support.

More Loaders Installed

Western Pennsylvania, where the newly modernized Isabella operation of the Weirton Coal Co. went through the year with all coal handled by Myers-Whaley "Automat" loading machines—also used to mine diamond-shaped pillars by cutting across one side and leaving a thin fender against the gob (July, 1938, *Coal Age*, p. 51)—found a number of operators either inaugurating the use of loading machines or adding to equipment already in service. The Buckeye Coal Co., for example, installed three more loaders and a universal cutting machine, and placed two of the loaders in pillar sections. Good results from the installation of two 8BU loading machines at its Naomi mine were reported by the Hillman Coal & Coke Co. Cardox for breaking down mechanically loaded coal also was adopted. And in 1938, Penncoal, Inc., employed an 8BU loader in the extraction of pillars in an old mine in the Pittsburgh seam near Brownsville.

In the thin-coal areas of western and central Pennsylvania, conveyors still held the leading position in 1938. The Clearfield Bituminous Coal Corporation, as a case in point, continued to employ shaker and chain units and in addition installed a number of "mobile conveyors" (June, 1938, *Coal Age*, p. 54) in room, pillar and entry work. This

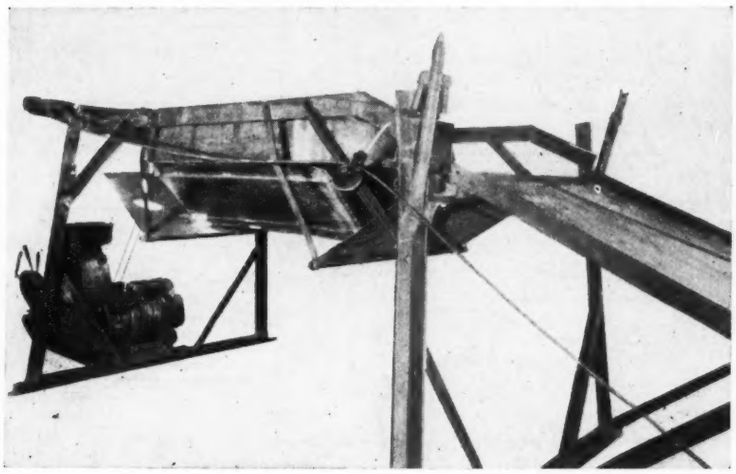
type of equipment, the company reports, has certain special advantages over conventional units in that its flexibility makes its use advantageous under conditions precluding the use of regular equipment. In addition, it increases the earnings of the miners. Clearfield also reported the development of an improved type of scraper equipment for loading both coal and rock in entry development. Results have been rapid and economical advancement where material other than coal is taken from either the top or the bottom.

Northern West Virginia continued the active installation of loading machines in 1938, a major development being the opening of Robinson Run No. 2 mine of the Christopher Mining Co., replacing the original No. 1 mine (*Coal Age,* August, 1936, p. 315). Using six 10BU and 11BU loading machines on a multiple-shift schedule and employing 360 men, No. 2 mine is designed for a capacity of 6,000 tons per day.

Paralleling the installation of mobile loaders, such as a Joy Jr. unit loading onto conveyors at the Ridgeview Coal Co. mine at Nellis, operators in southern West Virginia also increased their use of conveying equipment. In fact, activity was quite marked in this department, taking in both chain and shaker types, in many cases with gathering or mother conveyors. The Micco mine of the West Virginia Coal & Coke Corporation, among others, was completely conveyorized in 1938, while one duckbill was added at the Rossmore mine, making a total of four shaker-duckbill sets in service. A Model HKC "Brownie" car puller was installed to handle trips at the conveyor loading station. Three mobile loading machines also have been moved in from other mines of the company, and these, with the duckbills, are now producing 50 per cent of the output.

Goodman duckbills are used with a 900-ft. mother conveyor in an installation started in April, 1938, at the Rita mine of the Logan-Chilton Coal Co., in Logan County, West Virginia. Shaker conveyors were used at this operation back in 1927, with units of the present type going in in 1936. Under the present set-up (January, 1939, *Coal Age,* p. 27), four shakers are operated as a unit and drive four places abreast, delivering the coal to the mother belt, which in turn discharges it into mine cars run through the loading station in trips. Room faces are advanced on an angle so that the length is increased to 60 to 70 ft., and when the rooms are driven up, the pillars are mined out on the retreat. The mine operates two shifts and the daily output with the four units is 450 tons. Tonnage per man employed underground per shift is 10.9, including supervisors.

Sheave used with the Smith drop-bottom pan system, showing how pan and ropes travel around it.



Erection view of the hoist, ramp and dump cradle used with the Smith pan system. This is how the installation appears when it is placed in position in a "duck's nest" in the mine. The pan is in dumping position with the doors open.

In a system of mechanical mining using new equipment developed and patented by Gilbert Smith, Fayetteville, W. Va., general manager of the Mason and Dunedin Coal companies and the Fire Creek Coal & Coke Co., box-shaped drop-bottom pans are employed instead of conveyors to mine rooms in coal as low as 22 in. in the Mason No. 1 mine. No track is used and the pan is pulled along the bottom by wire ropes. This is the only resemblance of the equipment to the drag scraper, it is stated. By providing a complete box body with tight-fitting doors in the bottom, the Smith pan-and-rope system is said to overcome the disadvantages of the scraper by eliminating spillage and pulverizing of the coal on the bottom, as well as digging into the bottom while traveling. Another major difference is in the use of a special sheave around which the head and tail ropes and the pan travel without manual attention, thus eliminating hooking ropes in and out of sheaves to direct the pan to the face of the room.

Dump at Room Mouth

In a "duck's nest" in the roof of the heading at the mouth of the room, the pans are dumped into regular mine cars by pulling them up a steel ramp to a position over the cars, where the doors open by gravity to discharge the coal. In the same way, the system can be arranged to discharge onto a cross or mother conveyor. Another advantage claimed for the equipment is that, as compared with room conveyors, practically no labor is involved in getting the equipment out when the room is finished. By arrangement with Mr. Smith, an experimental unit has been installed in 36-in. coal by the Gauley Mountain Coal Co., Jodie, W. Va.

Mechanization also was active still farther south through Virginia, Kentucky and Tennessee down into Alabama. Quite a few conveyors were installed in the latter State in particular in 1938, of which examples at mines of the Alabama By-Products Corporation were: Colta mine, two additional chain-and-flight units with auxiliary equipment as part of the program of mechanizing this operation, with two additional units also at the Praco mine. At the Barney mine, a three-drum mobile scraper-loading unit was moved in from another mine and put in service in development work.

LOADING-MACHINE SALES

+ Fall Less Than Output in 1938*

By L. N. PLEIN, J. J. GALLAGHER, M. VAN SICLEN and F. G. TRYON †

SALES of mechanical loading equipment for use in both anthracite and bituminous mines declined in 1938, but at a rate much less than the drop in production. Whereas the total output of all coal—anthracite and bituminous—fell off 107,000,000 tons, or 22 per cent, sales of mobile loading machines declined by 17.5 per cent, and sales of conveyors by only 9.6 per cent. Declining prices and the increased wage scales effective since April, 1937, have stimulated the effort to reduce costs by mechanization. In 1938 the savings resulting from new installations of loading machinery appear to have been more than offset by the effects of low running time, which tends to cause a sharp increase in per-ton costs. Mine managers continued to seek economies, however, and the number of loading units purchased was greater than in any earlier year of equally low production. As stated by Julian D. Conover, secretary of the American Mining Congress, the coal industry "is taking its rightful place as one of the progressive industries which apply modern American methods in the production of one of our great natural resources."

Total Units Sold by Type—The number of mobile loaders sold during 1938 was 241, as against 292 in 1937 and 344 in the peak year of 1936. Despite the decrease, the sales in 1938 were far above those of the years from 1933 to 1935, in which production was actually higher than in 1938. Sales of scrapers, on the other hand, fell off very sharply to the lowest point covered by the record. Sales of conveyors, though below 1937 and 1936, were much above any preceding year. The figures for conveyor units include both hand-loaded types and those equipped with duckbills or other self-loading heads. The number of duckbills cannot be shown separately without disclosure of individual business, but it may be said that they are finding acceptance in many new fields. The total of 990 conveyor units also includes equipment purchased for use in conjunction with mobile loaders and therefore not destined for hand loading. It is estimated from manufacturers' reports that at least one-tenth of the conveyors sold to bituminous mines were for transportation behind mobile loaders. Conveyors intended for transportation in haulageways or slopes are not included in these totals.

A feature of the year was an apparent renewal of interest in the pit-car loader, sales of which rose from 32 in 1937 to 139 in 1938. In fact, the 1938 sales exceeded the total for the entire five years preceding. This machine, which represents the simplest type of mechanization of loading, was installed in great numbers between 1926 and 1930 in the fields of Indiana and Illinois. Only a few of the 1938 sales went to Illinois, however, and five-sixths of the year's shipments were made to West Virginia, where hitherto the pit-car loader has found little use. As in earlier years, American manufacturers of loading equipment sold a few machines to Canadian and Australian mines. These exports, however, are not included in the present statistics.

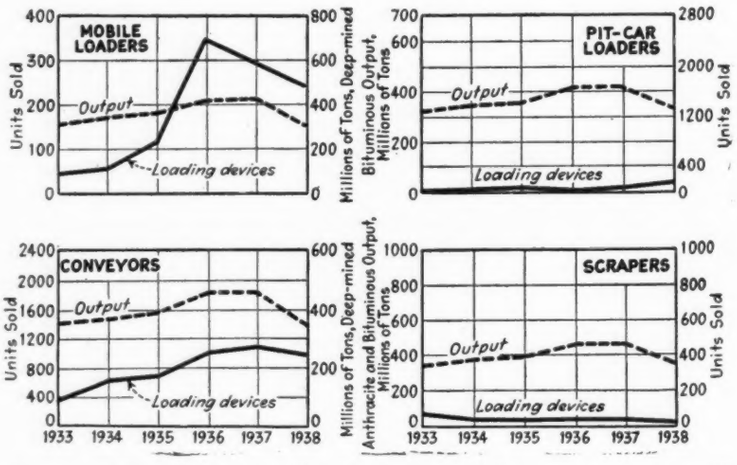


Fig. 1—Number of underground-loading devices sold for use in coal mines, 1933 to 1938, inclusive

Figures for conveyors include those equipped with duckbills and other self-loading heads. For comparison, total bituminous deep-mined output, in millions of tons, is shown with mobile loaders and pit-car loaders, and total anthracite and bituminous deep-mined output with scrapers and conveyors.

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† Messrs. Plein, Gallagher and Tryon, are members of the Research Division of the National Bituminous Coal Commission. Mr. van Siclen is chief engineer, Coal Economics Division, U. S. Bureau of Mines.

Table I—Mechanized Loading Equipment Sold to Bituminous and Anthracite Mines, as Reported by Identical Manufacturers, 1933 to 1938, Inclusive*

	1933	1934	1935	1936	1937	1938	Per cent increase (+) or decrease (−), 1938 over 1937
Mobile loaders	41	55	115	344	292	241	− 17.5
Scrapers †	65	34	22	28	29	10	− 65.5
Conveyors ‡	396	610	681	994	1,095	990	− 9.6
Pit-car loaders	18	26	28	11	32	139	+334.4

* The figures for 1933 to 1936 included reports from 28 manufacturers. In 1937, one manufacturer indicated that he was no longer producing this type of equipment and accordingly was dropped from the active list; however, at the same time another manufacturer was added to the list and the number of reporting firms remained at 28. In 1938, a manufacturer of material-handling machinery began the production of underground loading equipment and the number of reporting firms is now increased to 29.

† Reported as scrapers or scraper haulers and hoists.

‡ Includes hand-loaded conveyors and those equipped with duckbills and other self-loading heads. A considerable number of these in 1936 to 1938 were for use in conjunction with mobile loading machines.

The trends of sales are shown graphically in Fig. 1. The scales in this figure are arranged to give a rough indication of the relative importance of the several types of equipment in terms of tonnage capacity. It will be seen that the largest additions to capacity in 1938 continued to be made by the mobile loaders, followed by conveyors with or without self-loading heads. On the other hand, additions to capacity resulting from scrapers are small, as also are those from pit-car loaders, despite their sudden increase in 1938. The dotted lines in Fig. 1 represent total deep-mined production. Since practically all mobile loaders and pit-car loaders are used in bituminous mines, the charts for these two types show bituminous deep-mined output only. For scrapers and conveyors total anthracite and bituminous deep-mined output is used.

Source of Information—These figures are based upon returns courteously supplied by all known manufacturers of loading machinery for underground use in coal mines. The number of reporting firms is identical from year to year and the figures may be accepted as directly comparable.

Machines Go to 18 States

Total Sales by States—Shipments of mechanized loading devices of one type or another were made to eighteen States in 1938. In some cases it is not possible to show the number of machines of each type sold in each State without disclosing the business of individual manufacturers; therefore Table II has been prepared to indicate the total number of units shipped to each State or region. The kinds of machines sold are indicated by letters—*L* for mobile loaders, *S* for scrapers, *P* for pit-car loaders, and *C* for all types of conveyors. The several types are arranged in the rough order of the capacity shipped into each area in 1938. Thus, for Illinois, a total of 72 units is shown, followed by the letters *"L," "P,"* and *"C,"* indicating that the highest capacity was in the form of mobile loaders, followed by pit-car loaders and conveyors. Nearly all the conveyors shipped to this State were for use in conjunction with mobile loaders.

Units Sold Compared to Units in Use—The changing demand for the different types of loading equipment is shown in Table III. The number of mobile loaders in active use as reported by operators of bituminous mines increased from 488 in 1929 to 980 in 1936. Final statistics of the number in use in 1937 are not yet available. However, sales in 1937 and 1938 equalled 54.4 per cent of the number actually in use in 1936. Because of uncertainties in defining what constitutes a conveyor, the record of current sales is not fully comparable with the record of number previously in use, but the fact of a large increase is clear, particularly in bituminous-coal mining. The number of scrapers sold is now small, measured against the numbers previously installed. The number in use reached its peak in the bituminous fields in 1930 and in the anthracite fields in 1934.

Regional Distribution of Mechanized Capacity—For some years the proportion of underground output obtained by mechanical loading has been highest in the coal fields of the northern Rocky Mountains and the Middle West, where high wage rates, combined with favorable seam conditions, had stimulated the process of mechanization. In some fields in these areas, underground loading is now almost entirely mechanized and the rate of installation of new equipment therefore has tended to slow down. In the last three years, market conditions and the trend of wage rates have tended to stimulate mechanization in the Appalachian region, and by far the greater part of the shipments of new equipment in 1938 went to the coal States of the East and South.

By far the largest installations of mechanical-loading equipment in recent years have been made in West

Table II—Mechanized Loading Equipment Shipped for Use in Each State or Region in 1938

(L = Mobile loading machines; P = Pit-car loaders; S = Scrapers; C = Conveyors, including those with duckbills)

	Number of units of all types shipped in 1938	Types of equipment in approximate order of capacity
Northern Appalachian States:		
Pennsylvania and Maryland	99	L, C
Ohio	38	L, C
Souther Appalachian States:		
West Virginia	531	L, C, P, S
Virginia	14	L, C
Kentucky	133	L, C
Alabama	69	C, L, S
Tennessee	21	C, L
Middle Western States:		
Illinois	72	L, P, C
Indiana	9	L, C
Trans-Mississippi States:		
Arkansas and Oklahoma	46	C, L
Iowa and Missouri	3	C, S
Colorado	40	C, L
Utah and Montana	49	L, C
Wyoming	11	C, L
Total bituminous	1,135	L, C, P, S
Pennsylvania anthracite	245	C, S
Grand total	1,380	L, C, P, S

Table III—Sales of Mechanized Loading Equipment in 1937 and 1938 Compared With Total Number of Machines in Active Use in Preceding Years

	Number of machines in active use, as reported by mine operators								Number of machines sold, as reported by 29 manufacturers	
	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Bituminous mines:										
Mobile loading machines	488	545	583	548	523	534	657	980	292	241
Scrapers	126	150	146	128	93	119	78	106	13	6
Pit-car loaders	2,521	2,876	3,428	3,112	2,453	2,288	2,098	1,851	32	139
Conveyors equipped with duckbills and other self-loading heads	99	140	165	159	132	157	179	234	835†	749
Hand-loaded conveyors — number of units	...*	...*	...*	...*	525	574	670	936		
Anthracite mines (Pennsylvania):										
Mobile loading machines	350	384	5	11	18	14	1	504	.....	.....
Scrapers			457	479	455	517	507		16	4
Pit-car loaders			28	24	19	25	22		.....	.....
Conveyors equipped with duckbills and other self-loading heads	355	421	1	17	12	13	30	1,790	260†	241
Hand-loaded conveyors — number of units			547	818	940	1,338	1,563			

* Number of units not reported in these years. † Reported as face conveyors (hand-loaded), "shaker drives," and "duckbills." The figures of numbers sold in 1937 and 1938 are not exactly comparable with the number in use in 1936, because of uncertainties in defining what constitutes a conveyor.

Virginia. In 1935, only 2.1 per cent of the State's output was loaded mechanically, either directly or with the aid of conveyors. In the first ten months of 1938, according to the State Department of Mines, the proportion had increased to 20.3 per cent. Thus far, however, the large-scale installations of mechanical loading have been chiefly confined to the districts of the State where seam conditions are most favorable to mechanization, particularly in northern West Virginia and in selected portions of the southern high-volatile section. Thus, more than 77 per cent of the output of Monongalia County and over 46 per cent of that of Logan County now are loaded with the aid of mechanical devices. A significant development of 1938 was the rise in mechanical loading in the West Virginia Panhandle. In the smokeless fields, on the other hand, the percentage mechanically loaded still is small.

Table IV—Comparison of Mobile Loaders, Scrapers, and Conveyors in Actual Use in 1936 With Sales Reported in 1937 and 1938, by Regions

	Mobile loaders			Scrapers			Conveyors*		
	In use in 1936	Sales in 1937	Sales in 1938	In use in 1936	Sales in 1937	Sales in 1938	In use in 1936	Sales in 1937	Sales in 1938
Bituminous									
Northern Appalachian States:									
Pennsylvania	92	23	47	31	....	....	366	105	52
Maryland	....	....	....	....	....	....			
Ohio	47	28	15	....	....	....	18	37	23
Southern Appalachian States:									
Alabama	10	7	39[1]	27	5	2	64	64	64
Kentucky	5	18		11	....	....	35	106	98
Tennessee		1			1	....	21	38	20
West Virginia	126	73	80		5	3	196	275	332
Virginia	9	8	9	....	1	....	70	16	5
Middle Western States:									
Illinois	431	81	38[2]	....	....	....	7	19	20
Indiana	146	31		....	....	....			
Trans-Mississippi States	114[3]	22[4]	13[5]	37[6]	1[7]	1	393[8]	175[9]	135[10]
Total bituminous	980	292	241	106	13	6	1,170	835	749
Anthracite									
Pennsylvania	....	....	....	504	16	4	1,790[11]	260	241
Grand total	980	292	241	610	29	10	2,960	1,095	990

* Includes hand-loaded conveyors and conveyors equipped with duckbills or other self-loading heads. The figures of number in use in 1936 are not exactly comparable with the number sold in 1937 and 1938 because of uncertainties in defining what constitutes a conveyor. The comparison, however, will serve to indicate which regions have made the largest proportionate increases.

[1] Mostly in Kentucky. [2] Mostly in Illinois. [3] Includes Colorado, Montana, New Mexico, North Dakota, Utah and Wyoming. [4] Includes Arkansas, Montana, Utah and Wyoming. [5] Includes Colorado, Montana, Oklahoma, Utah and Wyoming. [6] Includes Arkansas, New Mexico, Oklahoma and Wyoming. [7] Wyoming. [8] Includes Arkansas, Colorado, Iowa, Montana, Utah, Washington and Wyoming. [9] Includes Arkansas, Colorado, Iowa, Utah and Wyoming. [10] Includes Arkansas, Colorado, Iowa, Oklahoma, Utah and Wyoming. [11] Includes a few pit-car loaders.

Table V—Bituminous Coal-Mining Companies Purchasing New Mechanized Loading Equipment in 1937 and 1938*

	Buying mobile loaders		Buying conveyors †	
	Companies that used mobile loaders in 1936	Companies that did not use mobile loaders in 1936	Companies that used conveyors in 1936	Companies that did not use conveyors in 1936
Northern Appalachian States:				
Pennsylvania	4	23	7	9
Maryland	.....	.....	2	.....
Ohio	3	7	2	7
Southern Appalachian States:				
West Virginia	16	25	6	28
Virginia	2	5	2	1
Kentucky	2	24	3	20
Tennessee	1	1	2	7
Alabama	1	3	2	6
Middle Western States:				
Illinois	16	6	1	4
Indiana	5	4	.....	1
Trans-Mississippi States:				
Arkansas	.....	1	3	7
Colorado	1	1	4	11
Iowa	.....	.....	.....	1
Montana	1	1	.....	.....
Oklahoma	.....	2	.....	6
Utah	4	.....	2	6
Wyoming	2	.....	4	.....
Total bituminous	58	103	40	114

* Covers the business of all but two manufacturers in 1937 and all but one in 1938. In addition, fifteen companies bought scrapers, of whom two used scrapers in 1936 and thirteen did not.

† Includes conveyors equipped with duckbills and other self-loading heads, and hand-loaded conveyors other than pit-car loaders.

Types of Equipment Purchased by Regions in 1938—Table IV shows the number of mechanical-loading units shipped into each State or area, in so far as the information can be published without revealing confidental data. All of the 241 mobile loaders sold went to the bituminous fields. Illinois-Indiana, formerly the largest market for this equipment and where 577 machines were in use in 1936, purchased 38 new machines in 1938, against 112 new machines in 1937. Forty-seven mobile loaders were sold in Pennsylvania, chiefly in the western district. Eighty loaders were sold in West Virginia, chiefly in the northern and Panhandle districts, with smaller numbers in the southern districts, both low and high volatile. Nine loaders were sold in Virginia and 39 in the three remaining Southern States of Alabama, Tennessee and Kentucky. Of these, by far the largest number went to Kentucky, the sales being about equally divided between the eastern and western districts of the State.

The largest market for conveyors also was found to be in the Southern fields. Total sales of all types in the Southern Appalachian States, including those equipped with duckbills, increased from 499 units in 1937 to 519 in 1938. In the northern Appalachians and the Far West, conveyor purchases declined.

More Companies Buy

Number of Bituminous Coal Companies Buying Loading Equipment in 1937 and 1938—The number of bituminous operating companies using mechanical-loading equipment continued to expand in the last two years. The companies installing loading equipment for the first time in 1937 and 1938 were aproximately double the number which merely added equipment similar to the kind they already had been using in 1936. This is shown by Table V, which analyzes the shipments of 26 manufacturers in 1937 and 28 in 1938. Though not complete, the records of these manufacturers indicate the trend. During the two-year period, 161 coal-mining companies purchased mobile loaders. It was found that 58 of these companies had used this type of equipment in 1936, while 103 were installing it for the first time. Similarly, 154 mining companies purchased conveyors, 114 for the first time. West Virginia, Kentucky and Pennsylvania led in the number of new companies taking up mobile loading; West Virginia, Kentucky and Colorado led in new conveyor trials.

BITUMINOUS STRIPPING

+ Holds Its Gains in 1938

BITUMINOUS stripping in 1938 was marked by a production approximately equal to that of 1937, although total soft-coal output was off 22½ per cent. In this respect, stripping results paralleled those of mechanized deep mining, in which the 1938 output also is estimated to be about the same as the 1937 total. The cost advantage of stripping, as compared with other methods of mining, was a major factor in the retention of tonnage in 1938, in addition to the greater producing capacity growing out of the introduction of a number of large stripping units and the opening of several sizable new mines in 1937, which began to show their mettle in 1938.

As one result of the 1937 spurt in equipment purchases, plus the business recession, no installations of large stripping or loading units were made in 1938, although a number of dragline and small-shovel operators purchased additional machines either for existing or new operations. And, like their brethren with large equipment, dragline and small-shovel operators also enjoyed a fairly active year. A substantial increase in stripping projects in Ohio and Pennsylvania, in addition to those in the older fields of the Middle West, Southwest and certain outlying districts, was another 1938 development. Prospects for 1939 include increased interest in stripping coal under deep overburden requiring the use of the largest shovels or shovels and draglines in tandem. Walking draglines also received greater consideration.

But even though no additions to large equipment were made last year, operators continued efforts to increase stripping capacity by such methods as larger dippers—in practically all cases of welded high-tensile-strength alloy steel. Where dippers in the range from 6 to 12 cu.yd.—sometimes even larger—had been used, high-strength alloys and welding permitted a 2- to 5-cu.yd. increase in capacity, usually with no increase in loaded weight and sometimes a decrease. Numerous loading shovels also were equipped with larger alloy dippers.

Sidewall drilling showed another substantial gain in 1938, with an increase in the number of companies using the "double-deck" shooting system for overburden. There also was some increase in the use of vertical augers for drilling purposes, although the fact that this type of equipment can show appreciable advantages only under special conditions limited the installations of new units. But vertical augers for drilling coal were adopted by many stripping organizations in 1938.

Most of the double-deck shooting plans in the industry are in operation in Indiana, where the latest recruit was the Old Glory No. 17 operation of the Maumee Collieries Co., stripping with an all-electric 12-cu.yd. walking dragline. With a cut depth of 65 ft. and 35 to 45 ft. of shale, or sandstone and shale, over the coal, horizontal holes originially were employed. In the summer of 1938, horizontal holes were supplemented by angle holes drilled upward toward the back of the cut (December, 1938, *Coal Age,* p. 81), and the explosive charge was split between the horizontal hole and the supplementary angle hole of a pair. Results included a reduction of approximately 10 per cent in screenings output, a drop in the quantity of explosive, and a gain of 5 ft. in cut width. The Heitzman rubber blasting plug for stemming sidewall holes was tried out by a number of stripping companies in 1938, with good results reported. This plug replaces the conventional stemming and saves most of the time that otherwise must be devoted to this operation. In addition, better fragmentation at the back of the hole was noted by some operators.

Automotive transportation again was a major item in strip-mine plans in 1938, and was reflected in new installations of both tractor-trailer and straight-truck units at existing pits, as well as in all new operations started last year. In the tractor-trailer field, several new diesel-pow-

Shown ready to go to work at the Tiger mine, this butane-electric tractor is designed to pull a semi-trailer with a capacity of 80 tons of coal.

ered units were showing cost advantages over gasoline-powered types. And in the same field, a tractor big enough to handle two 40-ton semi- and full trailers or one 80-ton semi-trailer was developed for the Sinclair interests, which in 1937 installed several 40-ton semi-trailer units. The new tractor, put in service at the Tiger mine of the Hume-Sinclair Coal Mining Co., Hume, Mo., is now pulling two 40-ton trailers pending the construction of the new 80-ton job, expected to be completed about the end of February.

The 80-ton semi-trailer will be about 35 ft. long and 12 ft. wide, and will have 10-ft.-high sides. The tractor, a Dart butane-electric unit, is equipped with two Hercules "HXE" engines using butane as a fuel. The engines are connected to General Electric generators, which in turn feed 125-hp. (net) electric motors, one for each of the tandem rear axles. With the electric drive it is necessary only to move a lever to go forward or backward, and the speed in both directions, controlled by the pressure on the accelerator, is the same. Speed is limited to 32 m.p.h. by a circuit breaker, and the motors can withstand a 100-per-cent overload for five minutes.

Weight of the tractor is approximately 35,000 lb., while the semi-trailer weighs about 30,000 lb. Overall weight of the entire unit when loaded will be about 225,000 lb. Rear tandem dual tires on the tractor are 13.50x24 twenty-ply "Ground-Grip" units carrying 95 lb. of air pressure. Each has a load capacity of 11,400 lb. The springs are designed to bend 1 in. under a weight of 88,000 lb. The unit, according to preliminary calculations, is expected to save $6,000 annually.

In the line of auxiliary equipment, a number of additions to the list of companies using large tractor-powered carrying scrapers were made in 1938. At many mines, these units were used for helping out in box-cutting, building roads, improving drainage and other miscellaneous earth-moving jobs, with assistance in stripping as an added use in several instances, either in helping the regular units or in taking over the job of uncovering isolated patches of coal. And at the smaller operations, this equipment was given the entire stripping task in several cases. The Hillside Coal Co., Zanesville, Ohio, as an example, employed two LeTourneau "Carryall" scrapers powered by Caterpillar D8 tractors for removing overburden. Surface material was loaded and hauled directly, while the shale over the coal was broken up with an "Angledozer" and "Rooter" on one of the tractors and then removed all the way down to the coal. The two units, spoiling 550 ft. away, were reported to be averaging 175 cu.yd. per hour.

BITUMINOUS PREPARATION

+ Marked by Sustained Progress

WITH mechanical cleaning showing a substantial gain, bituminous preparation was marked by a high level of activity in 1938 in spite of a 22½-per-cent drop in output. As in other years, a major reason for the installation of mechanical cleaners, in addition to the usual benefits of greater uniformity and more efficient performance, was the spread of mechanical loading, bringing with it greater pressure for the transfer of the entire cleaning operation to the surface as a means of assuring the lowest possible production cost underground by avoiding stops for preparation at the face. Substantially the same philosophy also has been a major element in the erection of mechanical-cleaning plants at strip mines, thus enabling the management to move cleaning from the pit to a plant designed and equipped specifically for this purpose. Multiple-shift operation of plants was increasingly frequent in the year just past.

Mechanical-cleaning installations in 1938 covered a wide range of objectives from the preparation of an individual size up to cleaning all coal, in many cases, from as large as 6 in. down to zero. And with the rise in number of wet-washing installations, dewatering and drying engrossed the attention of an increasing number of preparation men. As a result, installation of heat and mechanical dryers, or combination plants, showed a marked gain last year, with screen and bin drying also receiving a new impetus. On the other hand, quite a number of operators elected to avoid the water problem, particularly with respect to the fine sizes, by putting in dry cleaners, or wet cleaners for the large coal and dry cleaners for the fines. In connection particularly with dry plants, but also with other types, dust elimination was set up as a major objective in an increasing number of installations. Raw-coal blending plants attracted more attention in 1938, which was reflected in several large-scale projects.

With stoker coal an increasingly important factor in the market picture, provisions for this size were an important element in the design of new plants, and were the principal objective in many of the revisions in existing structures. This naturally was reflected both in new crushing set-ups with regular and special equipment and in the active installation of special high-speed shakers or—more often—vibrating screens for separating stoker sizes from screenings or dedusting screenings for stoker use. Vibrating screens also made substantial gains in the field of large-coal screening, with a number of plants adopting them for handling the entire mine-run output and supplementing them in some cases with special distributing chutes to convey the different sizes to the loading tracks or other preparation equipment.

Mixing was again a major activity in 1938. And in stoker-coal production specifically, bins, proportioning conveyors and other equipment were adopted by many operators as a means of securing defi-

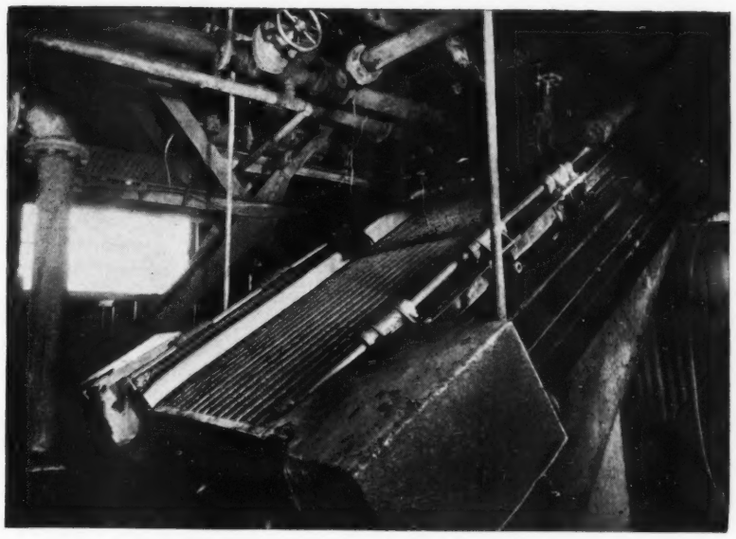
nite percentages of the various size fractions in the finished product. Dustproofing of stoker coal—and other sizes as well—again showed an increase in 1938, and progress was made in the development of petroleum or petroleum-base dustless-treating liquids for the high-moisture or porous coals of the Middle West and other regions.

Washing installations were again characterized in 1938 by a high upper limit of size in many instances. In the new plant of the Midwest Smokeless Fuel Co., for instance, all coal may be crushed to 6 in. and run to two Jeffrey Baum-type jigs. Washed and sized coal is distributed to loading booms and also to special truck-loading bins, first passing over Jeffrey-Traylor screens, by special multi-compartment conveyors with proportioning gates for loading all sizes in a variety of mixtures. Construction is along modern lines, with continuous sash areas for light and ventilation. Washing of all sizes from 6 in. down, using Link-Belt Simon-Carves equipment, was provided for in the new Westville No. 24 plant of the Peabody Coal Co., Danville, Ill. Designed for the production of almost any combination of sizes, either raw or washed, this plant also is equipped with an extensive rescreening plant and storage bins. Drainage bins are provided for drying purposes. At Pittsburg, Kan., the Commercial Fuel Co. installed another McNally-Norton automatic washer to permit cleaning all coal from 6 in. down, plus additional equipment to make it possible to load six sizes.

Washers Handle Large Coal

In the East, the Detroit Mining Co., Gordon, W. Va., purchased a Jeffrey diaphragm jig for handling 5x0-in. coal at the rate of 60 tons per hour. And in the Rocky Mountains, the United States Fuel Co. installed a McNally-Norton automatic washer for 5x0-in. coal in a new preparation plant at its mine at Hiawatha, Utah. Both heat- and mechanical-drying equipment is included and bins are provided, in addition to other mixing facilities, for blending the three smallest sizes in any desired proportion by means of variable-speed feeders. The Viking dual system has been installed to permit "Waxolizing" all sizes and mixtures. Size of the largest lump is controlled by means of a McNally-Norton pick breaker. A magnetic pulley precedes the main shaker, and slack is loaded over a chute.

Removal of the small fines was provided for in a number of installations washing up to a large top size. The Elk Horn Coal Corporation, for example, purchased a Jeffrey-Baum jig to clean 6x3/16-in. material at its No. 28 mine, Wayland, Ky., supplementing it with dewatering screens, water-clarification tank, etc. At Staunton, Ill., the Mt. Olive & Staunton Coal Co. built a washing and rescreening addition, in which the coal to the washer first is run over Jeffrey-Traylor screens to remove minus $\frac{1}{8}$-in. material. Washing is done in a Jeffrey-Baum jig, supplemented by sizing and dewatering screens, water-clarification system and other auxiliaries.



Vibrating screens make gains not only in the production of fine sizes and dedusting as above, but also in screening large coal.

Coal from 6 in. down to $\frac{1}{4}$ in. is washed in a 10-ft. Chance cone installed in a new Fairmont plant built at the No. 5 mine of the Pursglove Gas Coal Corporation, Pursglove, W. Va. At the Keen Mountain (Va.) plant of the Red Jacket Coal Corporation, minus 3/16-in. fines are taken out of the 3-in. feed to a Jeffrey-Baum jig.

A Morrow-Prins washer was chosen by the Crescent Coal Co., Bevier, Ky., for washing 2x0-in. coal in a new preparation plant now under construction. Supplementary equipment, in addition to the regular screening equipment, picking tables, etc., includes dewatering screens and a sludge-handling system. In southern Illinois, the Franklin County Coal Corporation, Inc., installed a washing, screening and mechanical-drying addition to its Royalton plant including a Menzies cone separator for washing 3x5/16-in. coal and two Koppers-Battelle launders in parallel for minus 5/16-in. material.

Washing units for cleaning certain specific sizes included last year such examples as: a Menzies hydroseparator for the Lillybrook Coal Co., Killarney, W. Va., 7x2-in. coal; another Menzies hydroseparator, replacing an older unit, for the Morris Run Coal Mining Co., Morris Run, Pa., $\frac{3}{4}$x$\frac{3}{8}$-in. coal; stove-size chloride washers for the Jewell Ridge Coal Corporation (one at each mine), Jewell Ridge, Va.; Consumers Mining Corporation, Graceland, Va.; and the Gilliam Coal & Coke Co., Gilliam, W. Va.; and a nut-and-stove unit for the Splash Dam Coal Corporation, Splashdam, Va.

A Jeffrey automatic diaphragm jig contracted for in 1937 was placed in service at the Dawson (N. M.) operation of the Stag Canon Branch of the Phelps Dodge Corporation to prepare 1½x1-in. pea and also, experimentally, a 1x½-in. stoker product. Total expenditure was $11.077.74 and only the removal of free impurities was contemplated. Reject on this basis in 1938 was 7.82 per cent of the raw feed, and the new product met with a very satisfactory reception.

Supplementing a Deister-Overstrom "Diagonal-Deck" table plant for preparing minus $\frac{1}{4}$-in. coal, the Alabama By-Products Corporation last year installed a classifier and rewash table for the purpose of better preparing the middlings from the primary tables. The installation was the first in Alabama and probably in any field.

For preparing 1x0-in. coal, primarily for stoker purposes, the New Jellico Coal Co., Morley, Tenn., installed a washing and screening plant designed by the Allen & Garcia Co. and equipped with eight Deister

"Plat-O" coal-washing tables and Gyrex and Vibrex screens for wet screening and dewatering.

Dry-cleaning installations in 1938 include a plant for 1¼x0-in. coal at the Big Rock (Va.) mine of the Buchanan County Coal Corporation, comprising a new-type American "Twin-Dex" pneumatic separator and a mechanical deduster for removing minus 40-mesh fines. In Pennsylvania, the Ringgold Coal Co. had a new sizing and cleaning plant constructed by the Fairmont Machinery Co. Equipment included vibrating screens throughout (Tyler-Niagara for large coal and Tyler electric for the small sizes), two American "Twin-Dex" separators for 3x ½- and ½x0-in. coal in addition to picking tables for plus 3-in. material, and an American metallic dust-collecting system. A new preparation plant of the Carbon Fuel Co., Decota, W. Va., was equipped with a Stump "Air-Flow" cleaner for ½x0-in. coal.

Combination plants erected in 1938 included a new operation at the Cadogan (Pa.) mine of the Allegheny River Mining Co. A Menzies hydroseparator was installed for washing 5x½-in. coal and a Stump "Air Flow" cleaner for improving ½x0-in. material.

Plant Made Dustproof

The second combination plant is that of the Mather Collieries, now on its way to completion. Following the example set in the Champion No. 6 plant of the Pittsburgh Coal Co. (January, 1938, *Coal Age*, p. 52) and the Isabella plant of the Weirton Coal Co. (July, 1938, *Coal Age*, p. 63), among others, this plant will be featured by dustproof construction. Also following in the footsteps of Isabella and other preceding operations, the Mather plant will include a 1,500-ton raw-coal blending bin. Construction will be modernized, using reinforced concrete. Menzies hydroseparators will clean 3x 5/16-in. coal and "Streamlined" Stump "Air-Flow" cleaners will prepare the minus 5/16-in. product.

Drying of washed coal, judging by installations either going into operation or contracted for in 1938, found operators still divided into several camps. Straight heat drying was selected by the following: Binkley Mining Co. of Missouri, Macon, Mo., McNally-Pittsburg Vissac equipment, ¾ in. x ½ mm.; Linton-Summit Coal Co., Linton, Ind., D-L-O equipment, ¾x0; Maumee Collieries Co., Linton, Ind., Christie, ⅜x0 or ¾x0; Truax-Traer Coal Co., Fiatt, Ill., McNally-Pittsburg Vissac, ¾ in.x½ mm.; and the Enos Coal Mining Co., Oakland City, Ind., Raymond equipment, 5/16 in.x10 mesh and 10x28 mesh. On the other hand, two Carpenter dryers were installed at the new plant of the Franklin County Coal Corporation, Inc., for 5/16x0-in. coal.

Drying facilities at the new Minnehaha plant of the Hickory Grove Coal Mining Corporation, Sullivan, Ind., include a Christie unit for 1x 5/16-in. material and a Howe continuous centrifugal dryer for 5/16-in.x35-mesh fines. The drying cycle is arranged, however, so that the minus 5/16-in. material may be run to the heat unit along with the larger coal either with or without passing through the centrifuge. The centrifuge also has been used for cleaning and reclaiming minus 35-mesh slurry, which is pumped into the machine along with the 5/16-in.x35-mesh product. One test has shown that 5 to 7 tons out of a feed of 20 to 25 tons of minus 35-mesh material to the centrifuge can be reclaimed with an ash of 7.56 per cent as a result of whirling out clay and other very fine impurities with the water. Combination equipment also was selected for the new Hiawatha plant of the United States Fuel Co., as follows: a McNally-Pittsburg Vissac dryer for 1⅝x3/16-in. coal and Carpenter centrifugal dryers for minus 5/16-in. material.

Many operators, however, stuck to dewatering screens of various kinds, but in two cases last year bins were called upon for part of the dewatering cycle. At the Cantine No. 2 mine of the Lumaghi Coal Co., Collinsville, Ill., where all coal from 3 in. down is washed in 3x1½-in. (day shift) and 1½x0-in. (night shift) fractions, these fractions are dewatered on Allis-Chalmers vibrating screens. These screens also size the small coal into 1½x5/16- and minus 5/16-in. sizes, which may be run to separate bins or combined in one. A fourth bin is provided for 3x1½-in. coal. All the bins are designed

New Bituminous Preparation Facilities in 1938*

Coal Company	Plant Location	Capacity Net Tons of Feed per Hour	Preparation Equipment
Allburn Collieries Co	McCarr, Ky	150	Robins[1]
Allegheny River Mining Co	Cadogan, Pa	225	Roberts & Schaefer[2]
Ajax Coal Co	Bulan, Ky	150	Morrow
Atlantic Crushed Coke Co	New Derry, Pa	15	Deister Machine[26]
Beckley Fire Creek Coal Co	Penman, W. Va	300	Kanawha
Binkley Mining Co. of Missouri	Macon, Mo	100	McNally-Pittsburg[4]
Black Mountain Corporation	Kenvir, Ky	300	Link-Belt
Blue Diamond Coal Co	Chevrolet, Ky	270	Morrow
Buchanan County Coal Corporation	Big Rock, Va	60	American[4]
Buffalo-Chilton Coal Co	Kistler, W. Va	200	Link-Belt
Carbon Fuel Co	Decota, W. Va	200 35	Robins[5] Roberts & Schaefer[6]
Carter Coal Co	Coalwood, W. Va	250	Jeffrey[7]
Central States Collieries, Inc	St. David, Ill	170	Link-Belt
Charleston Mining Co	Mt. Pleasant, Tenn	20	Link-Belt
Christopher Mining Co	Morgantown, W. Va	275	Link-Belt
Commercial Fuel Co	Pittsburg, Kan	250	McNally-Pittsburg[8]
Consolidation Coal Co	Van Lear, Ky	225	Robins[1]
Consumers Mining Corporation	Graceland, Va	40	Fuel Process[9]
Crescent Coal Co	Bevier, Ky	150	Morrow[10]
Detroit Mining Co	Gordon, W. Va	60	Jeffrey[11]
Douglas Coal Co	Fireco, W. Va	150	Robins[1]
Elk Creek Coal Co	Amherstdale, W. Va	250	Link-Belt
Elk Horn Coal Corporation	Wayland, Ky	300	Jeffrey[12]
Elk River Coal & Lumber Co	Widen, W. Va	100	Link-Belt
Elm Grove Mining Co	Elm Grove, W. Va	350	Morrow
Fifth Vein Coal Co	Harrisburg, Ill	1,000	McNally-Pittsburg[13]
Franklin County Coal Corporation, Inc	Royalton, Ill	270	Koppers-Rheolaveur[14]
Gilliam Coal & Coke Co	Gilliam, W. Va	35	Fuel Process[9]
E. O. Guthrie	Blanche, Ky	200	Morrow
Hance & Larsen	West Concord, Ohio	100	Morrow
Hardy-Burlingham Mining Co	Hardburly, Ky	500	Morrow
Harlan Central Coal Co	Tots, Ky	100	Link-Belt
Hills Creek Coal Co	West Blocton, Ala	15	Deister Machine[26]
Imperial Smokeless Coal Co	Quinwood, W. Va	125	Kanawha[27]
Inland Steel Co	Wheelwright, Ky	280	Link-Belt
Jewell Ridge Coal Corporation	Jewell, Va Jewell Valley, Va	50 75	Fuel Process[9] Fuel Process[9]
Kellys Creek Colliery Co	Maidsville, W. Va	425	Kanawha[28]
Koppers Coal Co	Kopperston, W. Va	400	Koppers-Rheolaveur[15]
Lillybrook Coal Co	Killarney, W. Va	100	Roberts & Schaefer[16]
Majestic Collieries Co	Majestic, Ky	400	Robins[17]
Marriott-Reed Coal Co	Lindburg, Mo	50	Link-Belt
Mather Collieries Co	Mather, Pa	400	Roberts & Schaefer[15]
Monitor Coal & Coke Co	Wilkinson, W. Va	100	Link-Belt
Montana Coal & Iron Co	Washoe, Mont	125	Link-Belt
Midwest Smokeless Fuel Co	Millstadt, Ill	350	Jeffrey[12]
Morris Run Coal Mining Co	Morris Run, Pa	40	Wilmot[18]
Mt. Olive & Staunton Coal Co	Staunton, Ill	400	Jeffrey[19]
New Jellico Coal Co	Morley, Tenn Morley, Tenn Morley, Tenn. (8)	120	Allen & Garcia[29] Robins[20] Deister Machine[26]
Oskaloosa Coal Co	Oskaloosa, Iowa	100	Link-Belt
Peabody Coal Co	Danville, Ill West Frankfort, Ill	650 200	Allen & Garcia Link-Belt[21] Link-Belt

for either rail or truck loading, and each is equipped with a unit heater to keep the coal warm while it is draining or waiting to be loaded. Screen dewatering and bin draining, it is reported, reduce the surface moisture in the 5/16x0-in. size to 10 per cent, with other sizes proportionately lower. Drainage bins, as noted above, also were included in the new Westville No. 24 plant of the Peabody Coal Co. This company also installed an experimental rotary heat dryer at its No. 47 mine, Harco, Ill.

Preparation of coal by screening and hand-picking in 1938 also was marked by activity paralleling that in mechanical cleaning. Production of additional sizes, particularly stoker coal, as indicated above, was a major item in revisions in existing plants and also figured in new operations. Mechanization of loading played its part here as well as in the mechanical-cleaning end. As an example, the Superior Coal Co., Gillespie, Ill., mechanized its fourth mine in 1938 and at the same time installed a new tipple to bring preparation to a level comparable with underground efficiency.

The changing size picture was reflected in the design of a number of tipples and rescreening plants contracted for in 1938. Rescreening and crushing facilities, for instance, were included in the plant of the Sterling Coal Co., Whitby, W. Va., with crushing facilities in the E. O. Guthrie plant, Blanche, Ky. The Carter Coal Co., Coalwood, W. Va., installed a new steel rescreening plant including, among other facilities, seven Jeffrey-Traylor vibrating screens, a loading boom and a 50-ton storage bin. Storage facilities also were included in the new plant of the Oskaloosa Coal Co., Oskaloosa, Iowa, while the new tipple of the Koppers Coal Co., Kopperston, W. Va., was designed so that washing equipment could be added in the future, and also so that the capacity and number of sizes shipped could be doubled at a later date to take care of output from a second seam.

At the new Brilliant mine of the Kemmerer Coal Co., Frontier, Wyo., the tipple is equipped with storage conveyors to permit changing cars under the box-car loaders without stopping the tipple and the crusher is placed on a self-propelling truck to permit it to be used at two places in the plant. Slack is sized over a Jeffrey-Traylor vibrating screen and a new inertia-type vibrator has been installed for preparing 1x3/16-in. stoker coal. Intermediate and small sizes are dustproofed by the Viking process.

A three-track tipple with a capacity of 700 tons per hour was placed in service by the Union Pacific Coal Co. to serve its new D. O. Clark mine, Superior, Wyo. (*Coal Age*, November, 1938, p. 44). Equipment includes a high-intensity magnetic pulley for removing tramp iron from the mine-run output, pendulum-hung shaker screens with more accessible overhead drive for separating the coal into three sizes, picking tables, mixing conveyor, refuse and house-coal conveying and storage facilities, telescopic chute for loading slack and booms with car-changing chutes for loading sized coal. Counterweighted rewind retarders are employed.

New Bituminous Preparation Facilities in 1938—Contd.

Coal Company	Plant Location	Capacity Net Tons of Feed per Hour	Preparation Equipment
Pursglove Coal Mining Co	Pursglove, W. Va.	300	Fairmont United Engineers [22]
Walter S. Rae	Jackson Center, Pa.	125	Morrow
Red Jacket Coal Corporation	Keen Mountain, Va.	170	Jeffrey [12]
Red Parrot Coal Co.	Affinity, W. Va.	250	Kanawha
Ringgold Coal Co.	Timblin, Pa.	150	Fairmont American [23]
Ritchie-Wilmoth Coal Co.	West Columbia, W. Va.	75	Morrow
Riverview Mining Co.	Coalburg, W. Va.	...	Kanawha [30]
Rochester & Pittsburgh Coal Co.	Lucerne, Pa.	350	Link-Belt
Splash Dam Coal Corporation	Splashdam, Va.	40	Fuel Process [9]
Sterling Smokeless Coal Co.	Whitby, W. Va.	250	Fairmont
Superior Coal Co.	Gillespie, Ill.	700	McNally-Pittsburg
Three Point Coal Co.	Three Point, Ky.	175	Link-Belt
Truax-Traer Coal Co.	Fiatt, Ill.	150	McNally-Pittsburg [3]
		...	Robins [24]
Truax-Traer Coal Co.	Marfork, W. Va.	50	Kanawha [1]
Tube City Collieries, Inc.	Versailles, Pa.	110	Link-Belt
Union Coal Co.	Peru, Ill.	100	Link-Belt
United States Fuel Co.	Hiawatha, Utah	300	McNally-Pittsburg [25]
Youghiogheny & Ohio Coal Co.	Van, W. Va.	300	Kanawha

* Also includes complete plants and major installations of preparation equipment in existing structures.
[1] Including Gyrex screen equipment. [2] Mensies hydroseparator and Stump "Air-Flow" coal-cleaning equipment. [3] Vissac heat-drying equipment. [4] Including American "Twin-Dex" pneumatic separator and auxiliaries. [5] Includes Gyrex screen for mine-run, Robins slate picker, storage bin, etc.

[6] Stump "Air-Flow" coal-cleaning equipment and auxiliaries. [7] Rescreening plant, including Jeffrey-Traylor screens. [8] Addition to plant involving McNally-Norton automatic washer to supplement existing unit and make it possible to wash all coal from 6-in. down. [9] Calcium-chloride washing unit built by Kanawha Mfg. Co. [10] Including Morrow-Prins washer for 2x0-in. coal, 100 tons per hour.

[11] Jeffrey diaphragm jig and auxiliaries. [12] Includes Jeffrey Baum-type jig and auxiliaries. [13] Screening, crushing, conveying and loading equipment supplementing existing Sahara Coal Co. tipple and washing plant. [14] Includes Mensies cone separator, Koppers-Battelle launders and Carpenter dryers. [15] Designed for later expansion to 800 tons per hour to take production from a second seam.

[16] Mensies hydroseparator coal-washing equipment. [17] Capacity of Gyrex screen handling mine-run feed; new equipment also included Vibrex screen, 225 tons per hour, for making 1½x¾-in. coal from 1¼-in. screenings. [18] Including dust-proof construction, 1,500-ton raw-coal blending bin, Mensies hydroseparators and Stump "Air-Flow" cleaners. [19] Rescreening and washing addition, including Jeffrey-Traylor screens and Jeffrey Baum-type jig. [20] Including one Gyrex and one Vibrex screens for wet sizing and dewatering; two additional Vibrex screens, 175 tons per hour, purchased for dedusting stoker coal at ¼ in.

[21] Including Link-Belt Simon-Carves coal-washing equipment. [22] Chance sand-flotation equipment, 200 tons per hour, for 6x¼-in. coal. [23] Includes American "Twin-Dex" pneumatic separators, American metallic dust-collecting system, American "Anti-Gravity" screens, etc. [24] Includes Gyrex screen equipment, 200 tons per hour, for scalping 1¼-in. coal from a minus 3-in. feed and for making wet separation at ⅞-in.; also Vibrex equipment, 150 tons per hour, for removing minus ⅛-in. coal from ¾-in.x¾-mm. dried product. [25] Including McNally-Norton automatic washer, Vissac heat dryer and Carpenter centrifugal dryers. [26] Deister "Plat-O" 16-ft. coal-washing tables. [27] Pea-screening plant (½x¾-in.) with two Symons vibrating screens. [28] River-loading tipple (slack, nut or egg), 200 to 425 tons per hour. [29] Washery and stoker-coal plant. [30] Rail-and-river tipple, including Gyrex screens and Robins vibrating distributing chute. [31] Including pea-coal screening and loading equipment.

Many Revisions Made

Revisions in and additions to existing plants covered a wide variety of methods of improving market acceptance, of which the following are examples: Nos. 4 and 5 mines, Vesta Coal Co., California and Vestaburg, Pa., inspection tables; Bergoo (W. Va.) No. 2 mine, Pardee & Curtin Lumber Co., vibrating screens and a crusher; Nellis (W. Va.) mine, Nellis Coal Corporation, additional facilities, including headframe, conveyors and chutes, for loading stove and nut; Northwestern Improvement Co., additional picking tables and a crusher at the No. 3 mine, Roslyn, Wash., and remodeling of the No. 5 tipple, including changing from d.c. to a.c. and the installation of a crusher; Scandia Coal Co., Madrid, Iowa, conveyors and vibrators for making stoker coal and a Viking system for dustproofing stoker, nut and egg; Colorado & Utah Coal Co., Mount Harris, Colo., thoroughgoing changes to improve removal of impurities and insure careful sizing and also installation of oil-treating equipment for stoker and slack; Colony Coal Co., Rock Springs, Wyo., installation of a "Waxolizing" plant for nut, pea, stoker and slack; and the Sunshine Anthracite Coal Co., Clarksville, Wyo., installation of a

100-ton mine-run storage bin, McNally-Norton pick breaker with integral screen for breaking all large coal to 7 in., Ottumwa scraper-line box-car loader and roller-type mechanical pickers.

Further reflecting the increased demand for specially prepared fine coal for stokers, the Peabody Coal Co., among others, installed equipment at its Black Arrow No. 18, Westville No. 24 and Great Heart No. 30 mines, in Illinois and Kentucky, for so-called "prescription" mixing of this grade: i.e., so that the several size fractions making up the final product can be mixed in any prescribed percentages.

With vibrating screens—accepted by many operators as more compact, requiring less power and more efficient—being installed in increasing numbers for sizing large coal, as in the case of the Ringgold installation noted above, steps were taken to facilitate the distribution of the various sizes after they left the screens, which are, as a general rule, much shorter than shakers making a corresponding series of sizes would be. At the Majestic (Ky.) mine of the Majestic Collieries Co., this problem was attacked by placing the new vibrating unit (Gyrex, two decks, 400 tons of mine-run per hour, 4½-in. lump, 4½x1⅛-in. egg and 1½-in. screenings) ahead of the original screen so that the various sizes could discharge onto the old unit for final screening and picking.

Vibrating Chutes Installed

In plants of the Riverview Coal Mining Co., Coalburg, W. Va., and the National Mining Co., Sygan, Pa., however, distribution of sizes to the various loading tracks or other points in the tipple was assured by the use of the new Robins vibrating chute, a self-contained unit following the vibrator and equipped with the necessary rescreens, discharge chutes, etc. (June, 1938, *Coal Age*, p. 59). A similar chute was installed in the new plant purchased by the Allburn Collieries Co., McCarr, Ky., in 1938, which includes a Gyrex screen for separating mine-run into lump, egg and slack.

With a Gyrex two-deck screen and a vibrating distributing chute, in addition to the "Air-Flow" cleaner noted above, the No. 7 plant of the Carbon Fuel Co., Decota, W. Va., has a capacity of 200 tons per hour, with the screen separating the mine-run feed, containing a few lumps as large as 8 in., into plus 1⅛-, 1⅛x½- and minus ½-in. sizes. The plus 1⅛-in. coal, after leaving the top deck of the screen, passes over a 4-ft. Robins slate-picker section and then to a picking belt and a double-roll crusher. Minus ½-in. coal, after cleaning, is run to a 100-ton storage bin. The plant is equipped with two loading tracks and is operated by three men. Facilities for oil-treating stoker are installed. Ahead of the tipple the company has erected a 300-ton storage tank equipped with breaker bars to facilitate breaking down the mine-run product, as little coal over 1⅛ in. is sold.

Hand-picking operations at numerous plants were improved by the installation of special lighting equipment, as detailed in the article beginning on p. 65 of this issue. Trademarking, or identification of coal, was the subject of more interest in 1938, many operators adopting or continuing the use of cardboard disks, squares, etc.; labels pasted on lumps on the tops of loaded cars, etc. Dyeing of coal was continued by a few producers, and a number of operators adopted the "Dustlix" trademarking machine, whereby gummed squares are fed into the coal as it is loaded. Included in the group purchasing machines were the Chicago, Wilmington & Franklin Coal Co., West Frankfort, Ill.; Bell & Zoller Coal & Mining Co., Zeigler, Ill.; Consolidated Coal Co., Herrin, Ill.; Mt. Olive & Staunton Coal Co., Staunton, Ill.; Elk Horn Coal Corporation, Wayland, Ky.; and the Harlan-Wallins Coal Corporation, Verda, Ky.

Dustless treatment of coal made new advances in the year just past, with the majority of the producing organizations selecting petroleum or petroleum-base treating materials. Hot spraying was the usual practice, although some operators, in view of findings by at least one manufacturer of spray oils that heated materials were practically cooled by the time they hit the coal, evinced interest in cold-spraying equipment, such as the "Brownie" unit at the Talleydale plant of the Snow Hill Coal Corporation, Terre Haute, Ind. Among the installations of dustless-treatment systems in 1938, in addition to those mentioned elsewhere in this article, as well as the considerable number not specifically noted, were "Dustlix" plants, including Viking heating equipment, by the McLaren Coal Co., Carterville, Ill.; Maumee Collieries Co., Terre Haute, Ind. (Chieftain No. 20 mine); and the Glendora Coal Co., Sullivan, Ind.

Iowa, which, due to the nature of its coal, has had difficulty in securing a good job of dustproofing, reported the development of a special spray oil in 1938 which seems to solve its problems. Improvement of the shipping qualities of coal as a result of oil or wax treatment was another result noted by a number of operators. The Colony Coal Co., in the case of the rather friable coal in the Rock Springs field of Wyoming, reported a belief that the wax-treating system mentioned earlier in this article would improve the quality of its nut, pea, stoker and slack sizes upon arrival at destination.

In Indiana, the Electric Shovel Coal Corporation, at its Staunton plant, was using a paraffin-base treating fluid, not only for dustproofing but also to arrest the escape of moisture from Brazil Block coal and thus prevent disintegration during shipment. Pour point of the liquid used is 90 to 100 deg. F. and the viscosity is 200 seconds. Close control of temperature and pressure at the point of application has been found necessary, and consequently they are held at 165 deg. F. and 135 to 140 lb. per square inch. Results include a reduction of as much as 10 per cent in the production of material smaller than 1¼ in. from breakage in the loading and subsequent handling.

Coal Stored by Water

A different system of storing fine washed coal was reported by the Dale Coal Co., Ravensdale, Wash., which employs a Deister-Overstrom "Diagonal-Deck" coal-washing table for preparing minus 3/32-in. coal. The cleaned coal from the table is pumped to the top of the tipple, where it enters a flume which carries it to the storage site several hundred feet away. The cost to this point consists only of the pumping charge. At the storage point, the coal is deposited in separate cones and windows to permit drainage, and when called for is loaded by a heavy scraper over a ramp directly to the railroad cars. Loading cost does not exceed 5 or 6c. per ton. The company finds the system an effective and inexpensive method of taking care of fines during the domestic season and thus making them available for application on certain contracts during the summer months when domestic production usually is almost at a standstill.

Refuse-disposal developments in 1938 were marked by the installation of a diesel tractor and an 11-cu.yd. trailer at the Omar No. 4 mine of the West Virginia Coal & Coke Corporation, Omar, W. Va. The new equipment replaced a small motorized larry car and the company reports that it not only expedited the removal of waste material but also reduced the cost of this operation.

POWER-EQUIPMENT USE

+ Reflects Mechanical-Mining Progress

POWER SUPPLY and the selection and maintenance of machinery at mines automatically assumed a more important rôle in 1938 as a result of continued progress in the mechanization of the various mine-operating activities, particularly loading. Mechanical maintenance and electrical safety at both underground and strip mines made substantial gains in the past year, and manufacturers played their part by developing new products aimed at better service and lower operating costs.

Improvements to mine boiler rooms and increases in generating capacity were noted, but the local plant-purchased power ratio remained practically undisturbed. In Colorado, however, a new 750-kw. power plant embracing all the latest equipment for automatic power production was installed at the Mount Harris mine of the Colorado & Utah Coal Co. Steam is supplied by a Babcock & Wilcox high-pressure boiler burning pulverized coal and generating steam at a rate of 50,000 lb. per hour. A 750-kw. General Electric turbo-generator operating at 250 lb. per square inch gage and 200 deg. of superheat supplies current to the mine and town.

Typical of boiler-room improvements to lower steam cost was the installation of spreader-type stokers to replace hand-firing under five 150-hp. boilers at the Black Hawk mine in Indiana, thereby reducing the labor required and permitting the use of fuel of a much lower value. In the field of central stations, one of coal's biggest customers, several superposed turbines using steam at 1,200 to 1,250 lb. and 900 to 950 deg. F. and exhausting to existing 200- to 235-lb. turbines were installed.

More power to mine, transport to the tipple, and prepare each ton of coal is to be expected in any year of progress in mechanical loading and cleaning. Figures giving the national power picture for 1938 are not available, but the experience of coal companies in eleven counties in northern West Virginia served by the Monongahela West Penn Public Service Co. and mining 77 per cent of the tonnage produced in that area is typical of the trend. In 1937, the average consumption by this group was 5.2 kw.-hr. per ton. In 1938 (January to October, inclusive), the consumption was 5.95 kw.-hr. per ton, an increase of 14.4 per cent in this period.

A.c. Gains Underground

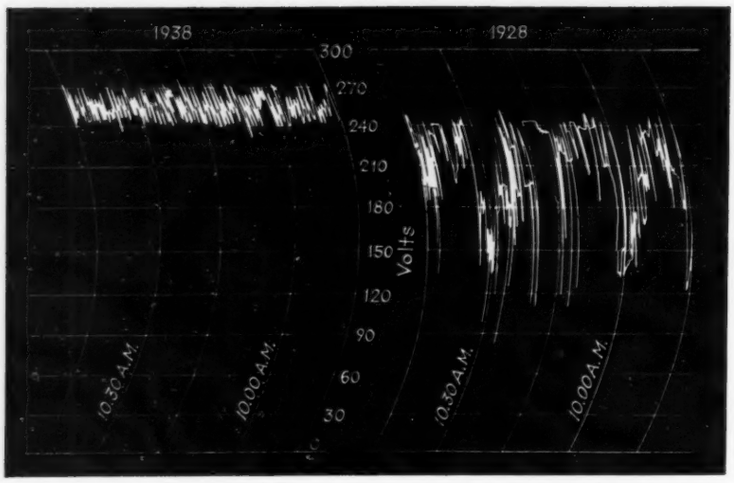
A trend toward alternating instead of direct current underground gained strength in 1938, bringing with it the counter-effect of reducing per-ton power consumption. With a.c., conversion losses are eliminated and transmission losses are likely to be considerably smaller. For new mines with conveyor transportation from face to portal, a preference is indicated for a.c. throughout. An example is the new No. 7 mine of the Carbon Fuel Co., Carbon, W. Va., opened last year, in which the undercutting, drilling and conveying machinery is driven by 220-volt a.c. This mine will be described in a future issue of *Coal Age*. The use of 220 volts is in contrast to several 440-volt a.c. mines opened in the two or three preceding years; for example, the New Centennial mine of the Boulder Valley Coal Co., in Colorado (*Coal Age,* September, 1938, p. 36); the Brule Smokeless Coal Co., Otsego, W. Va.; and Kelleys Creek Colliery Co., Ward, W. Va. This higher voltage also was adopted for the drives of shaker conveyors in the new mining work of the Liberty Fuel Co., Latuda, Utah (*Coal Age,* January, 1939, p. 45).

Electrical safety underground took a long stride forward as a result of installations of new-type transformers filled with non-inflammable liquid. Examples include the portable rectifier substations at the Isabella mine of the Weirton Coal Co., in Pennsylvania, using 346-kva. three-phase 4,085/264-volt transformers of that type (*Coal Age,* July 1938, p. 74); transformers supplying the 220-volt motors on underground dumps and other slope equipment at the Union Pacific Coal Co.'s new D. O. Clark mine, in Wyoming (*Coal Age,* November 1938, p. 51); and units of the same type installed in the Carbon Fuel Co. No. 7 all-conveyor mine.

In serving underground 440-volt a.c. conveyor and mining equipment, grounding by a fourth wire was adopted. At Brule Smokeless, for instance, a No. 2-size ground wire is installed in the main entries and a No. 4-size in the room entries. Rubber-covered cables extending from room entries to room faces, and containing the power wires and the ground wire, are insulated for 600 volts. Coal drills in the New Centennial mine are operated by 110-volt a.c. supplied by transformers mounted on the 440-volt cutting machines.

One large mine, Isabella, changed its d.c. distribution system and machinery from 550 to 275 volts. Reduction in voltage materially reduced nitrous-oxide difficulties in the controllers of permissible equipment, but in the controllers of the swing and gathering locomotives at Isabella the complete solution was installation of 1/50-hp. fans in the controllers with explosion-tested air inlets and outlets to provide ventilation for sweeping out the corrosive fumes.

The number of rectifier units supplying coal mines gained by 60 per cent in 1938. The first rectifier at a coal mine, a 300-kw. 550-volt multiple-anode unit, was installed in 1927 at the Rolfe mine of the Pocahontas Fuel Co., Worth, W. Va. The next, a 600-kw. 575-volt multiple-anode unit, was installed in 1936 at the Crescent No. 2 mine of the Pitts-



Voltage fluctuations for one hour in working sections—good practice of 1938 compared to common practice in 1928.

burgh Coal Co. The year 1937 was marked by the installation of six more units, four of which operate at the lower voltage of 275. At least five rectifiers went into coal-mining service in this country in 1938 and others have been shipped and will be installed this year. Two of those installed in 1938 are 600-kw. 600-volt multiple-anode units for stationary duty and three are ignitron units. Of the three ignitron-type units, one operates at 275 volts and two at 575 volts. Makers of the ignitron-type single-anode rectifiers advocate that type especially for 275-volt duty because the arc drop is claimed to be 16-30 volts, thus resulting in higher efficiency. One manufacturer announced a 200-kw. ignitron-type portable unit standing only 42 in. above the rail.

The two 600-kw. 600-volt multiple-anode units of 1938 were installed by the Vesta Coal Co., Pennsylvania, at the top of a new 512-ft.-deep ventilating and refuse-disposal shaft at Vesta No. 4 mine. Fully automatic in operation and feeding to a positive trolley, these rectifiers will carry approximately 40 per cent of the total mine load. One 400-kw. 275-volt ignitron-type rectifier was installed on the surface at the No. 2 operation of the Christopher Mining Co., Monongalia County, West Virginia.

At the Beech Bottom mine of the Windsor Power House Coal Co., Brooke County, West Virginia, which mine was changed to full-mechanical operation using twelve Joy 8BU loading units, the 575-volt d.c. power capacity was increased by installing two 400-kw. 575-volt ignitron rectifiers at the top of a 260-ft. borehole. Power transformers (25,000 volts primary), control transformers, high tension De-ion fuses and motor-operated air-break switches are outdoors. Rectifiers, heat exchangers and switchboards are inside a steel building. A six-pole anode circuit breaker at the substation is coordinated with an oil circuit breaker at the power station. Inside the mine and at the bottom of the borehole which accommodates the d.c. cables, two automatic reclosing breakers control two feeders to the trolley and mine-power-distribution systems. Through the borehole, two 1,500,000-circ.mil insulated copper cables constitute the "hot" line. The 8-in. steel casing, in parallel with two 1,000,000-circ.mil bare copper cables, constitutes the grounded line. This use of the casing as a conductor is similar to the practice of the Koppers Coal Co. (*Coal Age*, October 1938, p. 60). At the Stanaford (W. Va.) mine of the Koppers company, a second casing-conductor job went into service late in 1938 at a new substation containing two 275-volt conversion units of the rotating type.

Slowly but surely d.c. voltage is gaining the attention it merits after being neglected for 40 years by all but a few of the more progressive companies. Ten years ago standards limiting to 20 per cent the allowable voltage drop from substation to face generally were considered radical. Now, some companies have set the limit at 10 per cent, thus dignifying direct current with the same respect that a.c. motors, by reason of their inherent characteristics, demanded for alternating current (the a.c. motor refuses to start a heavy load if the voltage is low, while the d.c. motor nevertheless makes a determined effort). This 10-per-cent limit for d.c.-voltage drop is an essential element in the electrical program at the Isabella mine, and is based on keeping substations within 2,500 ft. of the working face and using feeders which will hold the average drop to less than 7½ per cent (July, 1938, *Coal Age*).

Relocation of d.c. substations at points either on the surface or underground close to load centers to improve voltage was rather general in 1938, supplementing the installation of additional units both to provide the necessary capacity and keep the voltage up. In the latter class, the Pardee & Curtin Lumber Co. put in an additional 300-kw. m.g. set at its Bergoo (W. Va.) No. 4 mine. At the Oakmont mine of the Hillman Coal & Coke Co., in Pennsylvania, an isolated substation was equipped with automatic controls to eliminate the necessity for attendance, while at the Emerald mine of the Emerald Coal Co., another Hillman operation, a new substation equipped with an m.g. set was erected on the surface at a point near the load center to improve the voltage. A new m.g. set was placed in service at the Samoset mine of the Alabama By-Products Corporation to improve power conditions at the face. The West Virginia Coal & Coke Corporation installed a new 300-kw. underground substation at its Rossmore (W. Va.) operation.

Boreholes Aid Distribution

Power-improvement measures undertaken by the Pocahontas Fuel Co., operating in the southern West Virginia-Virginia low-volatile region, included putting down boreholes at the back ends of two of its largest mines, supplementing these with full-automatic substations on the surface, one of which went into operation in 1938 and the other is to start early in 1939. With the completion of this program these mines will be supplied with power from three points: the pit mouth; a point halfway back (automatic substation); and a point all the way back (automatic substation). In Illinois, the Peabody Coal Co., in the light of the continued necessity for additional generating equipment underground, cut down several industrial-type switchboards 76 to 90 in. high and rebuilt them to an over-all height of 48 to 54 in., including the portable carrying truck.

Locomotive design in 1938 was featured by the development of several low-type high-powered units to meet the trend toward the operation of still thinner seams on a large scale. Control systems also were revised in a number of cases, and some additions to the list of tandem units

were made. The West Virginia Coal & Coke Corporation, for example, purchased a 10-ton locomotive, intending to combine it with a locomotive of the same size on hand to make a tandem job. This will bring to a total of five the number of tandem units operated by the company, which states that they are far superior to the small single locomotive. Among the advantages is the fact that trips of twice the size handled by a single locomotive can be moved with only half the number of operatives.

Storage-battery haulage gained a length by reason of the increasing use of rubber-tired gathering equipment, in addition to further installations of battery locomotives. In May, 1938, the Wick mine of the Ingle Coal Co., Oakland City, Ind., was changed from motor to rubber-tired gathering to become the fourth operation in the United States to be so equipped (*Coal Age,* October, 1938, p. 29). Each battery tractor pulls one 4-ton drop-bottom trail car. Batteries are Exide-Ironclad 24-cell 27-plate units.

Straight Parallel Preferred

The year brought into greater prominence a preference for straight-parallel operation of motors in locomotives of both the gathering and haulage types. Forty-ton units—two 20-ton locomotives in tandem—put into service by the Vesta Coal Co. have contactor controls of this multiple-point type and can start trips of 125 cars, as compared to 80-car starting with the series-parallel arrangement. The 8-ton Westinghouse gathering and swing locomotives in the Isabella mine have their motors permanently in parallel and are operated by a controller without the conventional reverse lever. The one controller lever is rotated in one direction for forward and in the opposite direction for reverse. These controllers are arranged for plugging on the first point. Protection against undue speed in moving the controller through first point is afforded by overload trips (*Coal Age,* July, 1938).

Field and armature coils with fiber-glass insulation were installed in trial quantities by several coal companies, principally on underground equipment subjected to heavy overloads and severe conditions. The Peabody Coal Co., as an example, has experimented with glass insulation and a certain quantity of high-temperature solder on various types of armatures at certain of its Illinois mines, all with the specific object of increasing the safe operating temperature.

The glass fibers, as they are now being made, are less than three ten-thousandths of an inch in diameter, or about one-fifteenth the thickness of ordinary bond letter paper. The fibers of glass-tape and magnet-wire insulation are not affected by temperatures below 700 deg. C. Apparently the advantages of glass insulation are many and the disadvantages few. On an edge approaching knife sharpness the material will break under pressure quicker than cotton insulation, but on edges with curvatures usually encountered in electrical design the resistance to mechanical damage is high. Due to its slick surface, slippage of the glass insulation causes some difficulty, but this disadvantage probably will be minimized or overcome.

Before bringing to an end the discussion of electrical developments it is in order to mention the advance made last year in safer handling of 4,000-volt trailing cables and portable machinery of the same voltage at strip mines. The use of a solid neutral from the grounded central point of Y-connected transformers (secondary voltage, 4,000 nominal) to the frames of strippers and other mobile pit machines was extended during the year. The Sunlight Coal Co., Boonville, Ind., installed in the solid neutral a reactor to reduce the possible voltage from equipment frame to ground in case of an electrical difficulty. Several other companies, including the Maumee Collieries Co. and the Binkley Mining Co., followed suit before the year ended.

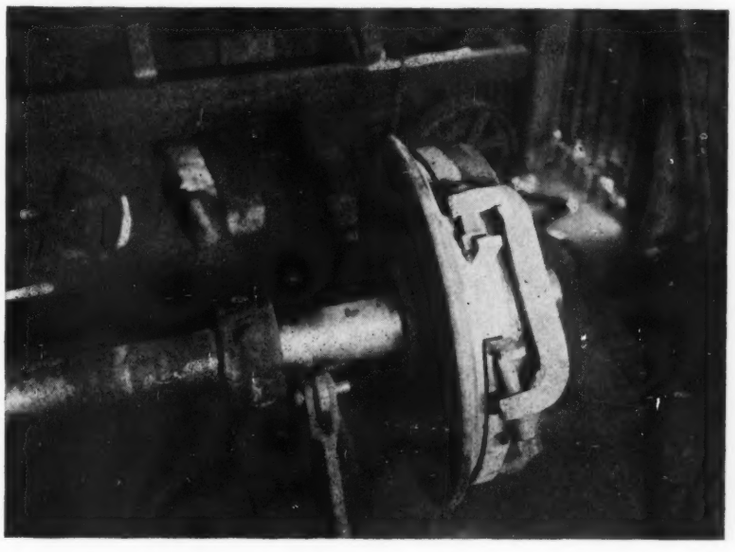
The Sunlight reactor—a General Electric unit—is rated at 50 amp., 2,300 volts, 135 kva., and is designed to hold the potential from stripper frame to ground to within about 100 volts in case of a grounded cable or motor. A five-second ground relay at the power-company substation is set to open the power-company oil circuit breaker at 43 amp. neutral current. One-second relays at the pit breakers will open the latter at 20 amp., thus preventing the opening of the main substation breaker except as a last resort (*Coal Age,* December, 1938, p. 88).

For motors in new preparation plants a voltage of 440, as against 220 and 2,300, held its preference. This is a logical selection because the danger with 440, as compared to 2,300, is much less and because the wiring sizes with 440 are approximately one-half those required for 220. Proper metal-clad and grounding protection for 440-volt stationary equipment above ground costs but little more than for the 220-volt type. With many producers the high-intensity mercury vapor lamps for picking-table illumination reached the stage of standard, or common, practice.

Improvements in lighting in still another direction found some adherents in 1938. Peabody, for instance, purchased a light meter as a result of the educational campaign carried on for better lighting and checked the lighting in its offices, revising the system where needed to bring the intensity up to the standard for office work.

Looking into the lists of portable electrical instruments now owned by

The technique of welding filler bands into tires has been developed to the point where many companies consider it entirely satisfactory.



coal companies, one instrument introduced but a few years ago now is used almost as widely as the d.c. voltmeter. It is the clip-over-type ammeter. One operation, Walter Bledsoe & Co., was found to be using this ammeter as a means of checking bonding conditions (*Coal Age,* December, 1938, p. 116).

Evidence that demand-limiting instruments and auxiliary equipments still are being installed appears in the case of the C. C. B. Division of the Koppers Coal Co. Installations at the Stanaford, Glen White, Stotesbury and Helen mines saved their cost in the first month. A description of this work will appear in a coming issue of *Coal Age.*

In the realm of mechanical design of electric locomotives, both underground and strip-mine units showed changes and progress. On the 8-ton gathering and swing locomotives in use at Isabella the conventional handwheel brake mechanism was replaced by a quick-acting lever-type brake on the top of the locomotive. It includes a quick-acting mechanism to facilitate placement of the brake lever in the most convenient position for the operatives. Lever-type brakes are not new but their adoption has been slow. The present trend is in keeping with the drive to reduce delays in car changing.

At the large strip operation of the Enos Coal Mining Co., Oakland City, Ind., a 4½-mile electric haulage system rounded out one year of satisfactory service. It replaced steam trains and is credited with cutting main haulage costs in half (*Coal Age,* December, 1938, p. 87). Drive trucks without through axles, termed "Axless" by the manufacturer (Differential Steel Car Co.), are a feature of these locomotives—used at Enos to pull 140 to 160 tons of coal at 30 to 40 m.p.h. Only the front truck of the locomotive is powered. Two 125-hp. 600-volt motors are used and each one drives the pair of wheels on its respective side. This independent drive for each side, it is asserted, reduces train resistance; decreases flange, tread and rail wear, and provides 40 per cent more adhesion.

Diesel locomotives for underground use, talked of for several years, have not appeared as yet in this country. One, rated at 40 to 50 hp., is in use underground in a coal mine in Scotland and it was reported during the year that plans were under way for installing diesels in two British mines (*Coal Age,* October, 1938, p. 62).

Mechanical design of equipment and also maintenance methods showed improvements. As an example, the use of anti-friction bearings in mine equipment was marked by additional gains. The Sunshine Anthracite Coal Co., Clarksville, Ark., for instance, rebuilt several old-type long-wall cutters with ball bearings, while in Illinois the Peabody Coal Co. continued certain phases of locomotive modernization involving the installation of ball and roller bearings on armatures and in journals to replace the original plain bearings. Several additional forced-ventilation units also were installed on Peabody locomotives. Anti-friction-bearing mine-car wheels again registered a substantial increase in 1938. In another field, experiments at anthracite mines gave rise to a conclusion that the use of micarta rings in pumps handling highly acid water would materially reduce pump maintenance (*Coal Age,* July, 1938, p. 88). Indications are that micarta rings will last twice as long as bronze and as long as or longer than chrome iron, stainless steel or hard rubber.

In maintenance work at certain strip mines the use of Dardelet "Rivet-Bolts" proved advantageous. For instance, when a 12-yd. dragline at Old Glory No. 17 mine of the Maumee Collieries was rebuilt, 8,000 were used. Mechanical supervisors with that company consider that these rivet-bolts more efficient than rivets and 40 per cent stronger. An aerial tramway tail tower 185 ft. high, built last winter at Cranberry No. 2 mine of the New River Co., Raleigh County, West Virginia, was erected with rivet-bolts (*Coal Age,* June, 1938, p. 39).

Tight Joints Assured

Many coal companies increased their use of Dresser couplings on air and water pipes. This sleeve-and-gasket-type of joint, originally developed for oil and gas lines, has the advantages, experience has shown, of holding tight with a certain amount of misalignment and making the pipe line more resistant to water hammer and to expansion and contraction with changes of temperature. Furthermore, the elimination of threads preserves the full strength of the pipe and saves on installation cost on many jobs. One of the large anthracite producers, the Hudson Coal Co., now uses Dresser couplings in all of its mines and its installations usually range from ¾ to 2 in., inclusive (*Coal Age,* September, 1938, p. 46).

The past year appears to have brought rather general recognition of the truth that efficient maintenance is practically out of the question if an inspection, repair or rebuilding job must be rushed to the limit. Spare locomotives, cutters and loading machines now are recognized to be a necessity. Some companies include in the mechanical equipment two spare units of each type so that one stands ready for emergency service while the second spare is undergoing repairs. Isabella mine is an example of a recently modernized operation having two extras in each major class of equipment (*Coal Age,* July, 1938).

Metallizing, the process whereby molten metal is sprayed onto equipment or machine parts to build up worn places or provide corrosive-resistant surfaces, made a good start during the year. This new mainte-

Degreasing with a special agent removes the fire hazard in maintenance.

nance kink was applied at Kings Station mine of the Princeton Mining Co., in Indiana, for reclaiming heat-treated shafts and other parts which became scored at the bearing fits or on other wearing surfaces.

For certain jobs of this character an arc-welding or gas-welding build-up is not satisfactory because the heat destroys the heat-treatment and reduces strength or causes warping or both. With the metallizing process the surface to be built up is first sandblasted to provide a secure anchorage. A number of different parts of loading machines and other underground d.c. equipment has been repaired in this fashion for the Kings Station mine by a commercial shop (*Coal Age,* December, 1938, p. 74).

It has been reported that a company in Pennsylvania, in addition to other applications, is using the metallizing process to spray mine-car bodies with zinc.

Arc-weld filling of locomotive tires appears to have made further gains during 1938 both at the small-to-medium and large mines. No standardization of tire arc-weld methods or techniques has as yet appeared. Many automatic machines are in use but the amount of manual tire welding probably far exceeds that done automatically. Welding high-carbon bands into grooves continues to be used widely and it appears that more tires are being welded at the mines and fewer at the commercial shops than in previous years.

Removal of grease and dirt is not so unimportant as to deserve this place in the last paragraph of this electrical and mechanical review. Cleanliness is recognized as a first principle in proper maintenance and until recently maintenance departments have been confronted with the fire danger of cleaning equipment with gasoline and similar inflammable liquids. During 1938 the Powellton Division of the Koppers Coal Co. adopted the use of "Gunk" as a cold hydro-degreasing fluid for cleaning machine parts. This apparently eliminates all fire danger connected with the former cleaning methods. A more detailed account of this application will appear in a coming issue of *Coal Age.*

MINE LIGHTING

+ Gains in Efficiency and Effectiveness

But More Work Is Necessary

By CARL E. EGELER
Illuminating Engineer
Nela Park Engineering Department
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ILLUMINATION underground and in coal-preparation plants in 1938 was marked by increased interest in the development and application of new equipment and methods designed to increase both comfort and efficiency. Previous advances in mine lighting had been more along the lines of extending the use of lighting methods already employed to a somewhat limited extent. For example, there was general appreciation of the good features of the permissible electric lamps, but with many mines not definitely classed as sufficiently gaseous to present an immediate explosion hazard, and with the economic difficulties of the past few years, the introduction of electric cap lamps was slower than would otherwise have been the case. The candlepower of the best equipment has been increased materially. Consequently, it now is possible to obtain from the better units average lighting levels over the day of around 5 foot-candles (units of illumination), and there has been a steady increase in the number of electric lamps employed. Thus, the individual worker has received better lighting, and approximately half of the portable lamps now are of the electric safety type.

For coal cleaning and preparation the trend is away from bare lamps of low or medium wattage which, when covered with dust, gave low levels of lighting and uncomfortable glare to the use of higher wattages and reflectors to obtain illumination of a type nearer production levels along with greater eye comfort. Instead of 100- and 200-watt bare lamps, several modern plants now are using 300- and 500-watt lamps and obtaining 15 to 20 and even higher foot-candle levels instead of 2 or 3 and even less in many locations.

The most outstanding advances have been made in lighting picking tables. There is a growing appreciation that the color of the light, as well as the intensity, are factors which directly affect the discrimination of the pickers. With a range of hues and surface textures encountered in the industry, more than one type of source has been found to meet best the requirements for different mines. In some plants the blue-green color of the 400-watt mercury-vapor lamp has given excellent results. Other operators have found that the daylight-quality illumination obtained from 500-watt Mazda lamps in combination with special cover glasses is advantageous. The use of these higher wattage sources produces illumination values of 100 to 250 foot-candles, which are comparable to the levels obtained on picking tables with natural lighting on good days. New fluorescent lamps producing daylight and light of other colors at high efficiency have been tried out; further developments in their application are indicated.

Underground on shaft bottoms and

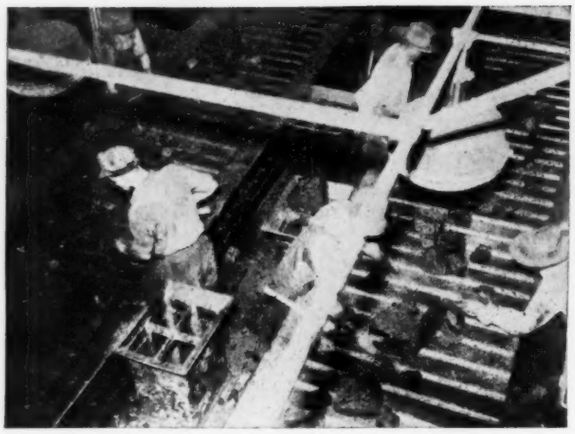


Fig. 1—400-watt mercury-vapor lamps are being used over picking tables in increasing numbers.

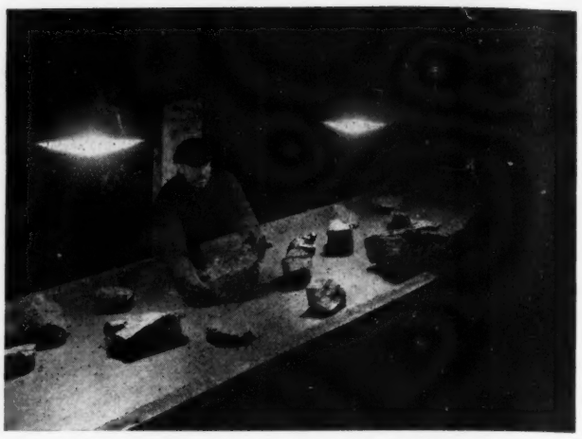


Fig. 2—500-watt Mazda lamps with daylight cover glasses in service over a coal-picking table.

along haulageways, the improvements have been less marked. While bare lamps still are the general practice, the use of dome-type and angle reflectors on shaft bottoms has not only improved the amount of light directed downward but has made it more comfortable. In the motor rooms, repair shops and storage spaces, similar methods of improving the lighting have been a little more noticeable. Softer shadows from lamps equipped with the large reflectors are much less disturbing to workers and the accident hazard is reduced.

Whiter Walls Needed

There is need for a much greater appreciation of the value of treating the walls and roofs of the more heavily traveled areas to increase the effectiveness of the illumination. With the reflection factor for coal usually about 5 per cent, conditions underground from the lighting standpoint are among the worst encountered in any industry. Normally, in industrial and commercial interiors the walls and ceiling will reflect several times the light redirected by the coal surfaces, and as a result not only is the illumination poorer underground for a given lamp wattage but the glare of the bright light source against the black background results in more annoying visual discomfort. Rock-dusting, whitewashing and painting are practicable methods of improving the situation. A comparison of the conditions obtaining in the locations shown in Fig. 3 with the gloomy and depressing effects in the untreated areas so commonly found requires no additional comment.

Recent new interest in better illumination underground has been stimulated largely by:

1. The rapid increase in mechanization.
2. Continued demand for cleaner coal.
3. Continued high cost of accidents.

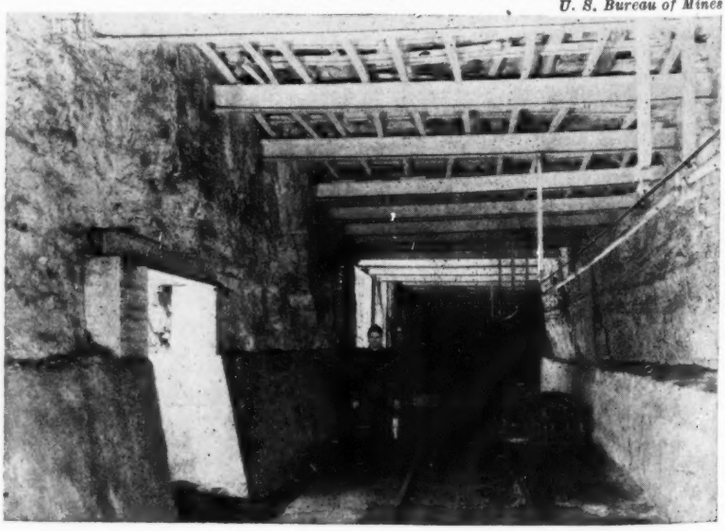
Operating companies do not need to have their attention called to the great strides which mechanized mining has made during the past decade, except that the significance of the new practice in relation to lighting requirements deserves emphasis. With estimates for 1938 indicating that well over 20 per cent of the coal mined underground is now being loaded mechanically, any contribution that can be made by better lighting becomes both of economic and humanitarian importance. The past few years have greatly increased the amount of definite and usable information available on good illumination and its function as more than just an aid for determining presence of and recognizing different objects.

For reasons with which most readers are familiar, past conceptions of underground lighting have been too much those of bare visibility with too little consideration of those phases involving greater quantity and quality which, directly and indirectly, affect accident hazard and production. Underground mechanization involves new concepts of operating procedure which warrant particular attention at this time to the lighting requirements. With each loading machine representing an investment of many thousands of dollars, the time element in loading involves much more than the direct labor costs involved; coordination of operation and reduction of delays are important factors.

Fundamentally, several new aspects in lighting are presented. Ma-

Fig. 3—More light in the working sections and greater eye comfort result when ribs and roof have a light or white color.

U. S. Bureau of Mines



chine operators, instead of being concerned primarily with what one can handle, say, with a small shovel, for which a good cap lamp gives satisfactory illumination, now must cover the area 8 to 10 ft. wide directly in front of the machine, at the same time continually overseeing delivery from the rear conveyor to the car and intermittently observing other parts of the face and roof both from the standpoints of loading and protection against falls. One method of attempting to meet loading requirements has been to place headlamps on the machines. With lamps usually less than 100 watts and with the units located on the machines where the dust conditions are worst, very low levels of illumination generally have resulted and the light has not been spread over an area sufficiently great to enable the operative to see clearly all of the elements of his task.

Fig. 4—1,500- and 1,000-watt floodlights promote safety and speed in handling yard traffic.

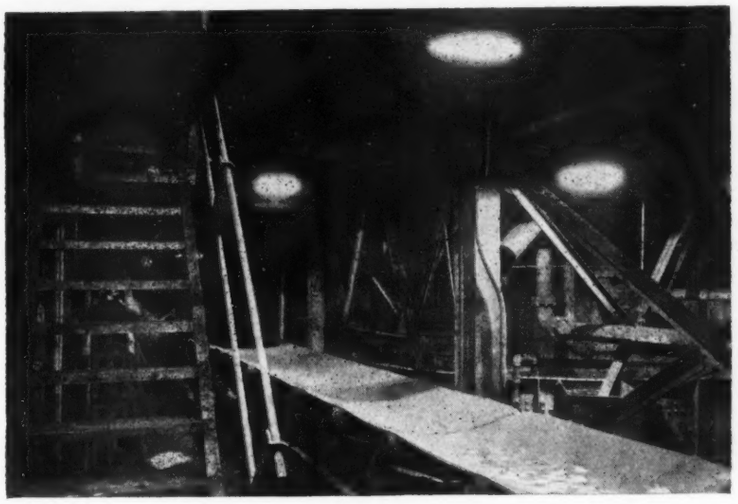


Fig. 5—Excellent lighting in a coal-preparation plant. The 300-watt lamps in porcelain enameled reflectors provide 12 to 15 foot-candles.

Face Lighting Studied

Another approach to the problem has been to locate floodlamps about 25 ft. or more back from the face, mounting them on the props with one lamp low to illuminate the area to the right of the loading machine and another farther back for the areas farthest to the left; lamp wattages of 150 and 200 were used. The light beams are directed not only to the area surrounding the front of the machine but, by proper adjustment of the second unit, the car being loaded and the additional face area also is lighted. With the units located back from the coal face, a close control of the light appears necessary so that the higher candlepower will not be sent toward the operative's eyes, thereby blinding them with the glare. Standard-voltage lamps connected to the power cable may be found the most practical method for the energy supply.

The problem of providing more illumination at the coal face for mechanical loading as well as for drilling and undercutting is by no means a simple one and the several aspects require further study and experiment for their solution. Portability of the lighting units, easy mounting, resistance to rough handling, the best method and source of energy, reduction of glare, cost and other aspects are involved in a practicable and satisfactory solution to the problem. It would appear that face illumination of this general type should be considered as supplementary to the best possible lighting that can be obtained from electric cap lamps, which are not only necessary to provide good working illumination anywhere that the miner may be underground but also as a dependable source which is not subject to the normal or accidental interruptions of the power circuits.

Lighting researches have revealed recently the previously unrealized importance of the direct and indirect physiological aspects of higher illumination levels embodying quality as well as quantity. These researches indicate that much closer approaches to daylight conditions are justified from the broad economic standpoint than arbitrary assumptions have indicated in the past. Admittedly, mining offers many limitations but present practice still provides many opportunities for progress from the now wide use of "raw" light to the introduction of the more simple features which other industries have employed with definite advantages in bringing their lighting more nearly in line with production and comfort standards.

Inside frosted lamps instead of clear ones, reflectors, higher wattages in many places, heavier copper or separate lighting circuits to reduce voltage drop losses and the bad fluctuations—these are some of the things that can be given attention without upsetting present practice and policies. Even though the results may be far from ideal, certainly these measures will be steps in the right direction: namely, utilizing lighting to create the best possible *seeing*, which definitely results in a pleasanter and safer working environment.

SAFETY TRENDS

+ In Coal Mining in 1938

By D. HARRINGTON
Chief, Health and Safety Branch
U. S. Bureau of Mines

THE YEAR 1938 was by no means prosperous or productive for the coal-mining industry. Neither was it one in which safety was advanced to any considerable extent, even though the tentative fatality rate per million tons produced (2.92) is lower than ever achieved prior to 1933. Table I gives the fatality rates and the total fatalities and production for 1930-1938, inclusive. Data for 1937 and 1938 are estimated or tentative, except that the 1,408 fatalities listed for 1937 constitute a final figure.

The fatality rate (tentative) of 2.64 deaths per million tons produced in bituminous mines in 1938 is lower than the 2.70 rate (also tentative) of 1937, but it is higher than the all-time low rate of 2.52 in 1936, the 2.50 rate in 1933, or the 2.60 rate of 1935. The 1938 tentative fatality rate of anthracite mines (5.08) is the highest since 1931, except the 5.24 rate of 1935. The tentative rate for coal mining as a whole in 1938 stands at 2.92. This is materially higher than the rate (tentative) for 1937 (2.85), but—except for 1933, 1936 and 1937—the lowest in the present century. Total fatalities in 1938, tentatively set at 1,128 (and not likely to exceed that number in the final figures), are the lowest for the coal mines of the United States in any year of the present century except 1933, when the deaths numbered 1,064.

Table II gives data on fatalities and fatality rates (per million tons produced) by main causes of accident occurrence for the past ten years. Figures for 1937 and 1938 are tentative but probably will not be far from the final figures when they become available. W. W. Adams, Bureau of Mines accident statistician, states that "except for the year 1933, when 833 men were killed, the estimated 900 deaths in bituminous mines in 1938 was the smallest number reported for any previous year since 1910, when complete records became available and when the number killed was 2,220." A reduction from 2,220 deaths in the bituminous-coal mines in 1910 to approximately 900 in 1938 indicates rather definitely that progress is being made in safety, even though that progress is not as great or as rapid as some of us would like.

Table II also shows that in 1938 the bituminous mines did a fair job in holding accidents from falls of roof and coal to a reasonable number: 492 instead of 604 in 1937 and 624 in 1936. Haulage fatalities and fatality rates, too, were held reasonably low in 1938 as compared with 1936 and 1937. The 82 fatalities from explosions of gas and dust represent by no means as good a record as the 41 from those causes in 1936, but are a definite improvement over the 119 fatalities from those occurrences in 1937.

If it were not for the much heavier fatality occurrence from explosions in 1938 than in 1936, the total fatality rate for coal mining as a whole in the United States in 1938 would have been almost as low as that of the record year of 1936. This emphasizes how vital an influence fatalities from explosions now have on the accident rate.

Both tables I and II indicate that anthracite is not making the same degree of safety progress as is bituminous mining. The tentative fatality rate (5.08) for anthracite in 1938 is the highest except one since 1931 (1935). The number of fatalities (132) and the rate (2.94) from falls of roof and coal were abnormally high. This also was true of explosions of gas (20 fatalities and 0.45 fatality rate). The latter were especially high in 1938 when compared with the very good record of 1937, when all anthracite mines operated through the year without a fatality from a gas explosion.

Table III gives some data in connection with the occurrence of major disasters (those in which five or more are killed) in coal mines. Since the all-time low record of one major disaster (seven deaths) in 1933, there has been a gradual increase both in number and severity. The number of

• The embarrassing fact confronts our coal-mining people that, while the past ten years has witnessed a much lower occurrence as well as rate of occurrence of accidents, fatals as well as non-fatals, as compared with earlier years, the accident trend is unmistakably upward. That our coal mines kill more than 1,000 persons per year and more or less severely maim several thousand others should be a challenge which our coal-mining people cannot fail to accept. When this is done in a wholeheartedly sincere way, accident occurrence in coal mines will be reduced so that mining will be on a par with the excellent record of the cement, railroad, and other so-called hazardous industries which have "tackled" their accident problem effectively and "beaten" it.

Table I—Coal-Mine Fatality Rates, United States, 1930–38, Inclusive

Year	Fatality rate per million tons: Bituminous	Anthracite	Combined	Fatalities	Total Tons
1930	3.46	6.40	3.84	2,063	536,911,136
1931	2.83	6.42	3.31	1,463	441,750,978
1932	3.09	4.99	3.36	1,207	359,565,093
1933	2.50	4.66	2.78	1,064	383,171,877
1934	2.65	4.69	2.93	1,222	416,536,313
1935	2.60	5.24	2.925	1,242	424,632,005
1936	2.52	4.46	2.73	1,342	491,138,762
1937	2.70*	4.15*	2.85*	1,412*	494,200,000*
1938	2.64*	5.08*	2.92*	1,128*	385,700,000*

*Tentative, as estimated Jan. 4, 1939, by W. W. Adams, Employment Statistics Section, U. S. Bureau of Mines. These figures are likely to vary but slightly from the final figures, which will not be available for several months.

[1] Published by permission of the Director, Bureau of Mines. (Not subject to copyright.) Submitted for publication in *Coal Age*, February, 1939.

fatalities per major disaster has gradually increased from seven in 1933 and eleven in 1934 to nearly seventeen in 1937 and fourteen in 1938. The maximum number of fatalities in any single disaster has grown much worse—from seven in 1933 to 34 in 1937 and 45 in 1938. Altogether, the outlook from the viewpoint of coal-mine disasters is by no means favorable, as the trend is entirely in the wrong direction, even though the average number of deaths from major explosions for the past six years has been only 48 instead of a similar average of 477 for 1906-10 inclusive.

Of the six major disasters of 1938, three were due to blasting on shift, one to electricity and an opened door, one to an open light, and one to a roof fall at a mechanized face. In every one of these occurences there was a combination of carelessness and poor management, with blame readily assessable against both management and workers and probably also against other agencies. In other words, all of these untoward occurrences were readily preventable and none of them could by any stretch of the imagination be termed "unavoidable," "a trade risk" or an "act of God."

As in 1937, more than half of the fatalities from major disasters last year were due to errors or poor practice in mechanized mines, and more than half of the fatalities from major disasters occurred on the afternoon or night shift. One major disaster in both years was due to black blasting powder in a small mine. As usual, the surrounding conditions were so unsafe that it was little short of a miracle that the disaster had not occurred sooner—and almost daily. As long as such poor blasting practices as use of black powder with fuse, shooting off the solid, and tamping with coal slack are allowed, there are almost certain to be disasters (major as well as minor) in our mines. If black blasting powder is allowed in any mine, certainly the blasting should not be done with the working shift in the mine.

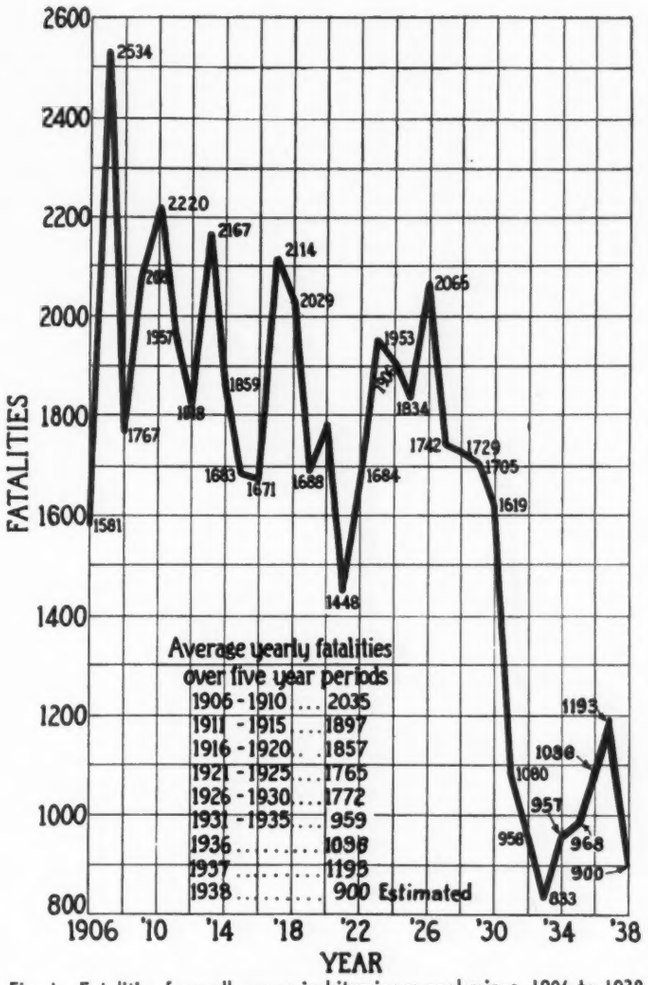


Fig. 1—Fatalities from all causes in bituminous coal mines, 1906 to 1938 inclusive.

Numerous "old offenders" appeared in the major disasters, as well as in many of the minor explosions and fires, of 1938. One of those was an explosion of gas by an open light in a mixed-light mine. Mixed open and closed lights should not be allowed in any coal mine, as scores of "unexpected" or "unusual" explosions have resulted from gas or dust ignitions by open lights in mixed-light mines. The lighting should be all open or all closed, preferably the latter. The old "unreliable" adobe, or mud-capped, shot took its usual

Table II—Coal-Mine Fatalities and Rates Per Million Short Tons by Causes 1936, 1937 and 1938

	Bituminous						Anthracite						Anthracite and Bituminous					
	1936		1937		1938		1936		1937		1938		1936		1937		1938	
	Fatals	Rate	Fatals	Rate	Fatals	Rate	Fatals	Rate	Fatals	Rate	Fatals	Rate	Fatals	Rate	Fatals	Rate	Fatals	Rate
Falls of roof and coal	624	1.43	604	1.37	492	1.44	120	2.20	120	2.31	132	2.94	744	1.51	724	1.47	624	1.62
Haulage	202	.46	241	.54	152	.44	26	.47	31	.60	24	.54	228	.46	272	.55	176	.45
Local gas and dust explosions	18	.04	24	.05	22	.06	11	.20	....	....	2	.04	29	.06	24	.05	24	.06
Major gas and dust explosions	23	.06	95	.22	60	.17	5	.10	....	....	18	.41	28	.06	95	.19	78	.20
Explosives	31	.07	29	.07	29	.09	20	.37	14	.27	13	.29	51	.11	43	.09	42	.11
Electricity	44	.10	52	.12	46	.13	8	.14	4	.08	2	.04	52	.11	56	.11	48	.12
Machinery	36	.08	36	.08	21	.07	2	.04	2	.04	....	....	38	.07	38	.07	21	.06
Miscellaneous underground	45	.10	27	.06	26	.08	24	.44	14	.27	15	.33	69	.14	41	.08	41	.11
Shaft	11	.03	15	.03	8	.03	6	.11	5	.10	3	.07	17	.04	20	.04	11	.03
Stripping or open-cut	15	.03	7	.02	10	.03	8	.14	6	.11	9	.20	23	.05	13	.03	19	.05
Surface	49	.11	63	.14	34	.10	14	.25	19	.37	10	.22	63	.12	82	.17	44	.11
	1,098	2.52	1,193	2.70	900	2.64	244	4.46	215	4.15	228	5.08	1,342	2.73	1,408	2.85	1,128	2.92

Note — The rates for 1937 and 1938 are tentative. All figures are based on data supplied by W. W. Adams.

toll in the year 1938, and in this it had active aid from the equally reprehensible practices of blasting from the power wires and of blasting with the working shift in the mine.

Non-permissible use of explosives and explosives devices took their usual toll of life and limb. This was true of both permissible explosives and Cardox, as both were used, one of them fairly freely, in mines without stemming, which is strictly against the permissibility requirements of both. Open electrical equipment started one major disaster and several other fires and explosions. The misnamed flame safety lamp caused its more or less usual gas ignitions and, as might be expected from past history in such cases, while in the hands of a mine official. Auxiliary underground fan installations had to their "credit" several gas ignitions with a few deaths and numerous severe burnings of workers. The open light did its usual ignition "stunts" in 1938, causing one major disaster and several additional ignitions, with one or more deaths and severe non-fatal burnings.

"At long last" the expected sometimes happens: For years it has been feared that concentration of numerous workers at one place in mechanized mines might result under some circumstances in multiple fatalities from relatively slight gas or dust ignitions or from a fairly small fall of overlying material. Some years ago a slight gas ignition at a conveyor face in low coal caused almost no property loss but resulted in the deaths of several workers from burns; in 1938 a fall occurred while ten men were engaged in recovering a conveyor face from a previous fall, and six of the ten were killed. This type of disaster is likely to occur at any time in mechanized workings where too much reliance is placed on supposedly "good roof" or where the carrying powers of the overlying strata are overemphasized.

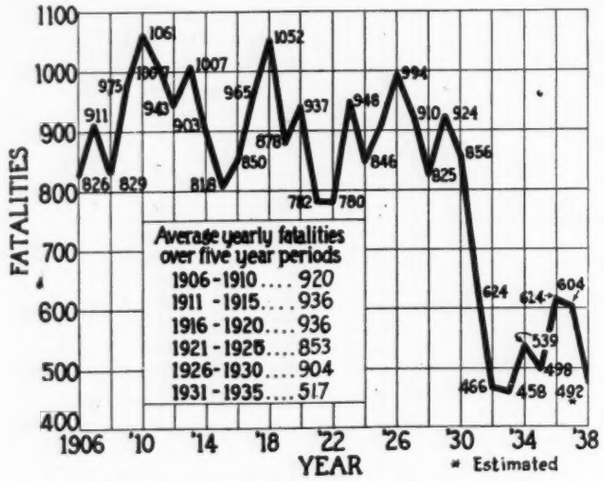


Fig. 2—Fatalities from roof and coal falls in bituminous coal mines, 1906 to 1938 inclusive.

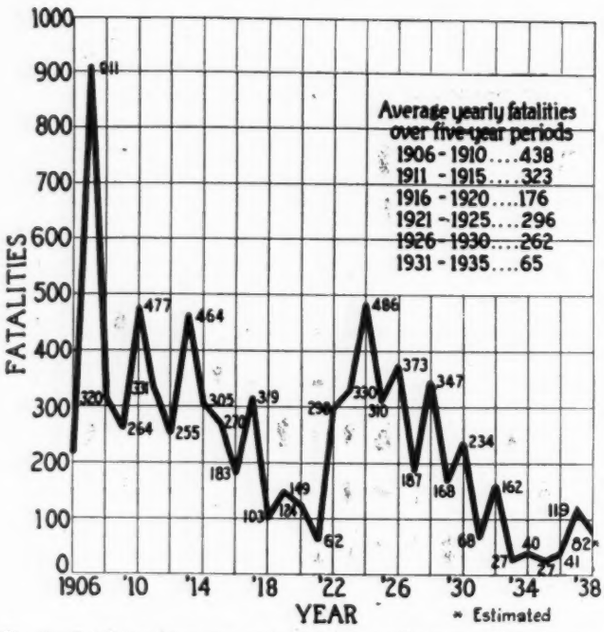


Fig. 3—Fatalities from gas and coal-dust explosions in bituminous coal mines, 1906 to 1938 inclusive.

Table III—Major Disasters in Coal Mines of the United States

Year	No. of Major Disasters	No. of Fatalities	No. of Fatalities per Disaster	Maximum Fatalities in any one Disaster
1933.....	1	7	7	7
1934.....	2	22	11	14
1935.....	4	35	8-3/4	13
1936.....	5	37	7-2/5	9
1937.....	6*	101	16-5/6	34
1938.....	6†	84	14	45

* One of these major disasters was an ignition of black blasting powder with six deaths, and coal dust may or may not have participated.
† One was a roof fall at a mechanized face (six fatalities).

The worst accident offender in number of fatalities is always falls of roof and coal. In 1938 this cause showed a distinct rise in the rate per million tons produced and in the percentage of total accidents (55.3), as compared with 51.4 per cent in 1937. Bituminous coal had a relatively good rate from fatalities from such falls last year (1.44) against 1.37 in 1937, but the anthracite rate was unduly (and unexpectedly) high—2.94 per million tons, against 2.31 in 1937. Figures for both years are tentative.

No remedy for this cause of more than 50 per cent of the fatal accidents in our coal mines has been ascertained, but education offers the brightest hope. This educational work must be carried not only to the individual underground workers but also to those in managerial positions, especially the underground bosses. Carrying the educational work to the individual underground worker—especially the one who breaks down and loads out the coal at the face—is a problem by no means well solved, though there are readily available agencies which, if rightly directed, could handle this phase of accident-prevention work far more effectively than it has been and is now done essentially without their aid. The rapid introduction of mechanization of various kinds necessitates that those entrusted with the direction and operation of these mechanized mines be kept informed

of the new hazards confronting those who work in mines when the old methods give way to the new. This latter educational work should be relatively simple, consisting as it does of acceptance of the fact that the introduction of any and every piece of mechanical equipment introduces new hazards (though it may remove other hazards) and those new hazards must be studied and means taken to meet them. It can be done because in numerous individual instances it has been done.

Haulage accidents are really the most difficult of all to handle effectively from the previous viewpoint, as they are analogous to the admittedly difficult problem confronting our nation in its street and highway traffic accidents. The number of fatal haulage accidents as well as rate of occurrence and percentage of the total were all "down" somewhat in 1938 as compared with 1937 or even 1936. There were some instances of multiple accidents on man-trips in slopes, but, fortunately, they did not result in many fatalities, though some of the non-fatal accidents from this cause were serious in the extreme.

Management Failures Noted

These accidents generally are due to rope breakage or to roof falls on man-trips and usually are management failures, though at times there are contributing delinquencies by workers in or operating the man-trips. A very serious man-trip accident occurred in a man-trip in a slope in a Canadian coal mine in 1938, with 21 fatalities out of the more than 200 persons on the trip when the rope broke. A runaway trip on a slope caused a coal-dust explosion in a British mine when some electrical equipment was ruptured by the runaway cars; the resultant are ignited coal dust thrown into the air by the runaway, and a considerable number of persons in the interior working were killed. The slope was supposed to have been rock-dusted to some extent.

This is a type of haulage accident that may occur at any time in mines in the United States using either trolley haulage or slope haulage with electric power or lighting lines on it or crossing it. Several disasters have occurred in the past in our mines from this cause. Utmost precautions should be taken against such occurrences in the future, by watering the floor, rock-dusting ribs and roof of haulage roads, keeping loose roof well "caught up" or pulled down, installing electrical equipment away from such haulage roads as far as feasible or making the installations as nearly proof against falls or runaway trips as may be feasible where electricity must be used on or crossing haulage roads. Of course, haulage practices and equipment should be maintained in a "high order" of repair and safety and working efficiency.

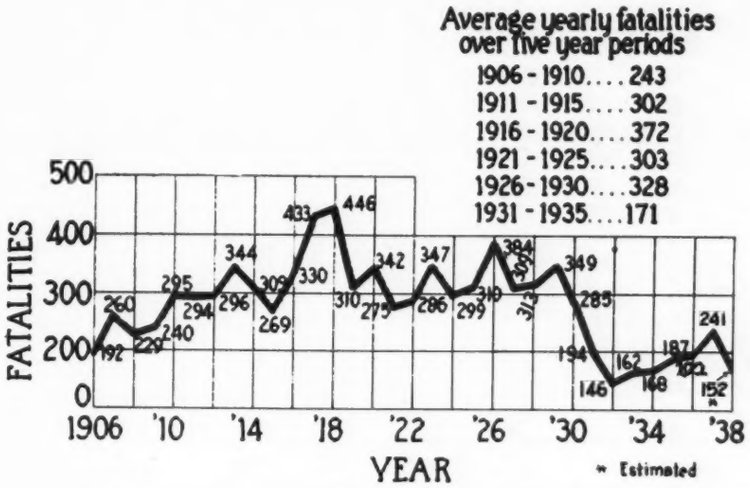


Fig. 4—Fatalities from haulage accidents in bituminous coal mines, 1906 to 1938 inclusive.

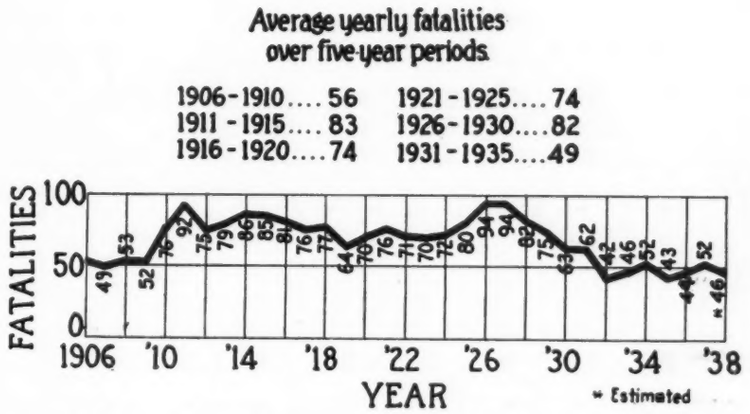


Fig. 5—Fatalities from electrical-contact accidents in bituminous coal mines, 1906 to 1938 inclusive.

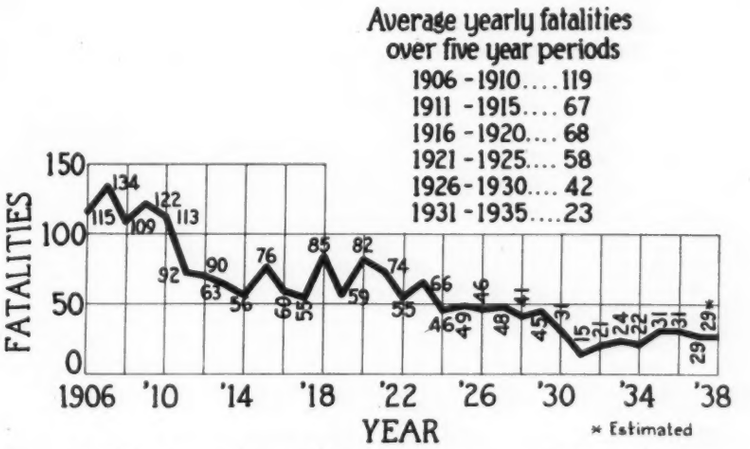


Fig. 6—Fatalities from explosives accidents in bituminous coal mines, 1906 to 1938 inclusive.

COAL DEVELOPS

+ Unexpected Possibilities

COAL RESEARCH is too firmly established in this country to be set back definitely by the discontinuance, at the close of 1938, of the program of Bituminous Coal Research, Inc., at the Battelle Memorial Institute, much as that discontinuance is to be regretted. Surely bituminous coal should do at least as much as the anthracite industry to support research, especially in view of its larger finances.

Probably the main use for coal always will be as a source of heat, and many unexplored possibilities still exist in this direction. Even agriculture could doubtless make much more use of coal for heating purposes than it does today, just as it is beginning to do in Europe. The American farmer might apply heat to the drying of grass and other forage crops, and the Battelle Institute, on behalf of Bituminous Coal Research, Inc., has been studying this possibility.

Next to fuel, soil culture is the biggest possible market for coal. Despite legal barriers erected around the word "fertilizer," coal may merit being thus designated, especially some coal. It surely is, at least, a land-betterment agent, and Dean C. R. Orton of the College of Agriculture, West Virginia University, expects this year to study the value of various coals for plant nutrition.

The only other project on the use of coal products for agriculture to be found in the accompanying tabulation visualizes the employment of anthracite ash. For Anthracite Industries, Inc., the Mellon Institute is testing the value of anthracite as a soil treatment and is showing, some say, not only speedier early growth than with soil untreated with ash but a better final crop, whether calculated by moist or dry weight. It is the ultimate dried product that really counts. It is said that anthracite ash mixed in a clayey soil reduces erosion and prevents the ground from baking hard and drying.

Even if some coal products will never pay even for their recovery and sale, they may be worth saving because the cost of getting rid of them in a manner satisfactory to the public would be an entire loss. Such an offender is flyash, and the study of the Detroit Edison Co., reported in *Mechanical Engineering,* November, 1938, p. 845, into the marketability of flyash is revealing.

About 4,500,000 tons of asphalt is used annually, including road oil; hence if 64 to 84 per cent as much flyash as asphalt were used in the mix, the annual demand for flyash would be between 2,880,000 and 3,780,000 tons a year. Flyash, though unable to satisfy the market, would have no monopoly, for limestone and silica dusts at $3 a ton would compete with it and portland cement at $7.50; yet flyash should be a profitable product at such figures if equally suitable.

Flyash Has Many Uses

Flyash may be used as light tempering adulterant in fertilizer to prevent the injury which vegetation would sustain if active chemical substances were used without dilution. However, the coal ash might in itself prove to be of specific value to the farmer, apart from its functions as a diluent. As filler in roofing material, flyash might find yet another outlet, and it can be used to form a much-needed compact envelope for cinder concrete, which without it is too porous. With it, a good haydite concrete can be made. Flyash cinder concrete also is excellent, because, while it is a material of acceptable strength, it also keeps corroding moisture from the steel which the concrete should shroud.

Cottrell block made from flyash, lime and resin gives remarkable results from every standpoint except friability, but provision can be made against that defect. Not abrasive enough for a metal polisher, it is said to serve for sandblasting as a mix with portland cement and as dust for coating brick molds.

Mellon Institute is looking for industrial uses both for anthracite and its ash, and many years back the Lehigh Navigation Coal Co. (under its older name) devised a furnace for producing clinker from refuse coal for the building industry. Only the depression in the construction trade delayed its marketing.

Protracted studies have been made by the Philadelphia & Reading Coal & Iron Co. into the possibilities of manufacturing, from anthracite, a substitute for carbon black. For this purpose the coal must be ground to proportions smaller than a micron, which is 0.000.04 in. Finely divided anthracite can be used also as a filler material for plastics and rubber. However, even if the entire field now held by carbon black were preempted by this so-called "micronized anthracite," the demand it would create for coal would still be small.

Long sold merely as crude solvent naphtha, coal-tar oil contained dicyclopentadiene and related compounds, which on being allowed to stand a long time created a resin. This, on examination, proved to have valuable properties. Eventually, these natural changes were accelerated with catalysts and methods of polymerization, of which heat properly regulated proved the most attractive (*Ind. & Eng. Chem.,* March, 1938, p. 245). Coating preparations containing it are proof against outdoor weathering and oxygen. It is well suited to electric work, is tasteless and odorless, and may be used for can linings, chewing gum and paper impregnation.

Heavy bodied solutions of this resin have been used successfully as a vehicle for aluminum paint, as gloss oil, gum lacquer, leather dressing and surface protective finish. It is a good varnish material in bodied drying oils, and it grinds well with asbestine, silica or kaolin and may

be used with carbon black, chrome green, lithopone, titanium and iron oxides. It is employed in the floor-tile, adhesives, rubber and printers' ink industries.

A new outlet for coal is nylon—a synthetic fiber-forming polymeric amide with a protein-like chemical structure which has been developed by E. I. duPont de Nemours & Co. The fiber is to be knitted into fine hosiery. It is said to be created from coal, water and air and to form filaments of extraordinary strength, fineness and elasticity. This material also has been used in the manufacture of water-repellent tooth brushes. Anthrafilt still continues to gain in sales.

Anthracite after exposure to a mild carbonization has been shown to have certain characteristics in analysis that reveal it clearly to be an altered, and not a natural, coal. Though with natural anthracites, higher volatile content is accompanied by higher heat value, with weathered or heated anthracite, higher volatile content accompanies a lower calorific intensity. Absence of carbon monoxide and hydrogen in a fire area has been held to show that the fire is extinguished, but tests of the Bureau of Mines have exhibited that bacteria can oxidize carbon monoxide so as to disguise the fact that the fire still burns and continues to make that gas. The bacteria also oxidize hydrogen to water. Many fires in the anthracite region are possibly recrudescences of old fires believed to be extinguished.

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(See also *Safety and Health*)

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(See also *Air Pollution: Smoke Abatement, Combustion, Domestic Furnaces, Preparation*)

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(See also *Nature of Coal, Preparation*)

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(See also *Domestic Furnaces, Physical Tests for Coal*)

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* Items starred indicate that work on such projects was still continuing at close of 1938.

† Items marked with a dagger were concluded in that year.

‡ Items marked with a double dagger indicate that a report probably will be made in 1939 or in the year therein indicated. Figures shown in parentheses against name of project indicate year in which the particular project was started. Absence of notation indicates the informant failed to indicate year of initiation or status of project. Notations following name of scientific body making the research and of the company sponsoring it refer to papers or reports in which these investigations were, in whole or in part, communicated. Certain of the items in the listings might with almost equal propriety be grouped under some other heading. Where the project is of multiple interest or where it cannot be listed under any one subject, it is placed under "Surveys" or "Miscellaneous."

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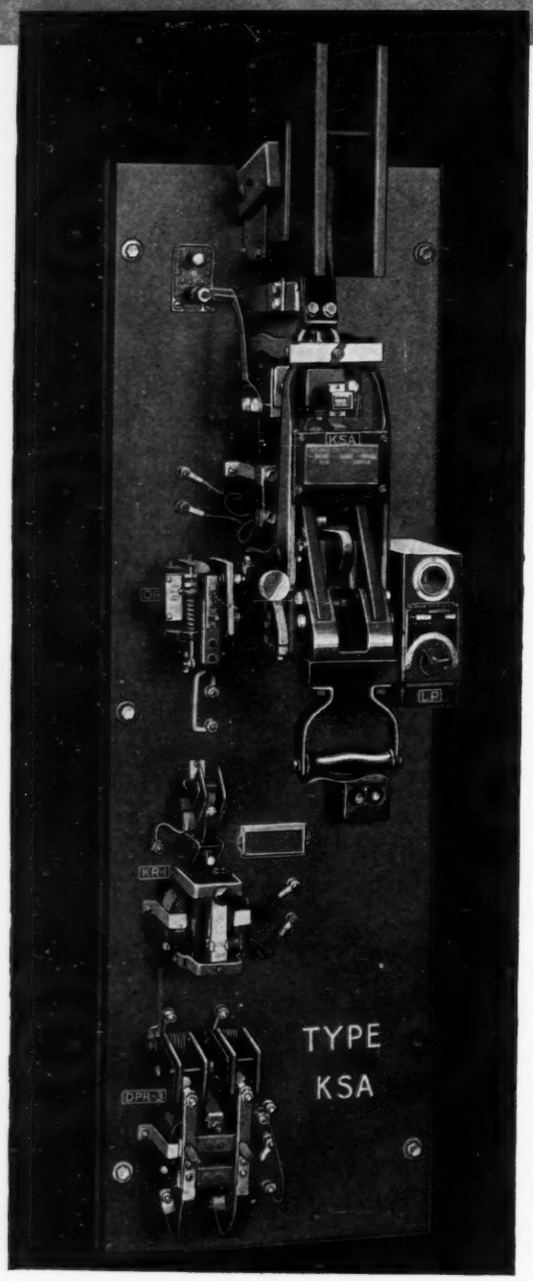
AUTOMATIC RECLOSING CIRCUIT BREAKERS . . .



One of the high-speed type KSA Automatic Reclosing Circuit Breakers arranged for operation in multiple with others at remote locations. The handle is for emergency use only.

I·T·E 1939
FIFTY-FIRST YEAR

IN SUBSTATION SERVICE

Advantages of the Type KSA circuit breakers are broadening their use

Type KSA circuit breakers are automatic protective switches arranged to reduce outage time to the safest minimum.

When a circuit protected by a Type KSA circuit breaker is opened as the result of a "short" or dangerous overload, automatic closing occurs at the instant that the short-circuit has cleared or the load has been reduced to a predetermined safe value.

Substation attendants are relieved of needless responsibility. Apparatus performs more dependably. Time which without KSA protection would be wasted can be applied to production. The total saving in a month or a year is an appreciable factor, particularly when short work-weeks and mounting taxes and other charges are considered.

May we describe for you the specific kinds of substation service to which the Type KSA circuit breaker is now being applied?

Representatives in Principal Mining Areas

I·T·E CIRCUIT BREAKER CO., PHILADELPHIA, PA.

OPERATING IDEAS

From

Production, Electrical and Mechanical Men

Yardage Tables Save Time And Prevent Errors

Many mine foremen and superintendents sit up nights getting out yardage sheets long overdue at the office, using three and four decimal points to arrive at the proper figures, remarks E. A. Smith, chief engineer, Central Elkhorn Coal Co., Estill, Ky., when the results could be arrived at much more quickly by means of tables prepared in advance. Using the long-hand system means inviting an expensive error with the extended decimals now required in many cases, in addition to the time involved.

It is an easy matter, Mr. Smith contends, to make up tables up to 100 yd.-in. by merely adding the rate successively to the previous total. From such a table both the rate per yard and the dollar amount for any number of yard-inches may be taken. A table can be made with very little effort. For example, if the rate for shot top is $0.12705 per yard-inch, this rate should be added to itself nine times. Thus the same figures, with the decimal point in a different place, should appear opposite ten: i.e., $1.2705. This gives a perfect check for all figures in the first block of ten. When the table has been extended to 20 yd.-in., the significant figures should be the same as those opposite two, again with the decimal point moved one figure to the right. By this method, a complete check of each block of ten numbers up to 100 can be made. "It is well to add the rate as follows, keeping the numbering up with the addition:"

(1) 12705
12705

(2) 25410
12705

(3) 38115 etc.

By this method, blocks of ten rates are obtained, such as the samples below:

Yd.-In.	Rate		Yd.-In.	Rate	
1—	.12705		51—	6.47955	
2—	.2541		52—	6.6066	
3—	.38115		53—	6.73365	
4—	.5082		54—	6.8607	
5—	.63525		55—	6.98775	
6—	.7623		56—	7.1148	
7—	.88935		57—	7.24185	
8—	1.0164		58—	7.3689	
9—	1.14345		59—	7.49595	
10—	1.2705	(Checked with 1)	60—	7.623	(Checked with 6)
11—	1.39755		61—	7.75005	

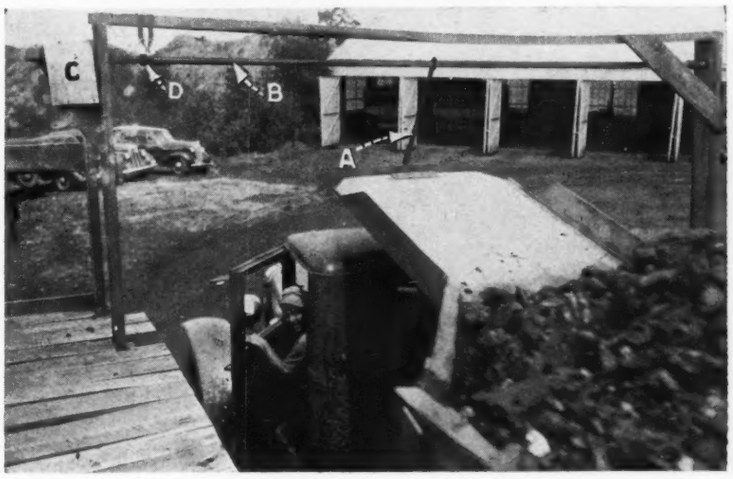
Arranging the table in blocks of ten rates, as above, seems the most logical method, as the eye naturally will turn to the proper block for the desired result.

"From the parts of the table above, the writer would read the rate per yard for 6 in. of thickness as $0.762. To get the rate for 9 yd. 6 in. thick, since 9x6=54 yd.-in., the figures opposite 54, or $6.86, would be the desired result. In case the product of yards and inches should run over 100 to, say, 110, the amount would be read opposite 11, which would give, with the necessary shifting of the decimal point, $13.98. In the same way, if the total is 510 yd.-in., the amount would be found at 51 and would be, with the decimal point in the proper place, $64.80. Proper use of such tables will save time and money and avoid expensive errors."

Trailer Loads Dumped Numbered by Counter

The number of semi-trailer loads dumped at the field-transfer station where the electric trains which haul from field to tipple at the Enos strip mine of the Enos Coal Mining Co., Oakland City, Ind., are loaded, is determined by a counter operated by an overhead lever, in turn moved by the passing truck. Referring to the illustration, Lever A is being pushed by a bumping angle attached to the cab guard apron. This rotates Rod B and it actuates the counter protected under the Cover C. A difficulty experienced when the counter was first installed was that the lever, after release by the truck, would oscillate and would sometimes make a second false count. This was eliminated by adding another lever which swings back and wedges by friction between Jaws D.

Truck loads totaled by a mechanical counter.



M.G. Power Factor Improved By Rebuilding Sets

"A great many of the older-type motor-generator sets are rated at unity power factor under full load," declares F. F. MacWilliams, Johnstown, Pa., and consequently "this means, in some cases, that there is very little chance to improve the power factor by increasing the synchronous field; also, the maximum permissible field current will not allow the machine to carry momentary overloads without excessive a.c. input.

"The writer has rebuilt several of these machines to eliminate the above difficulty. The machines in question had 441 turns on each synchronous field and it was im-

possible to cut out more than a small part of the field rheostat without overheating these fields. The fields—eight per machine—were rewound with the same-sized wire but with 541 turns each, or 100 more than each had originally. With the old fields working under 10.5 amp., the a.c. breaker would trip under a d.c. load of less than 600 amp. After being rewound the machine carries 750 amp. momentarily with perfect satisfaction and a field current of only 8.5 amp. This current still gives unity power factor at full load and leaves a little leeway for power-factor improvement if desired. This not only results in power saving of 0.5 kw. per hour, which, while small, counts up with continuous operation, but makes practically all of the field current effective, inasmuch as the field rheostat usually is cut out. There undoubtedly are many old machines in service on which a similar change would be beneficial."

Wireman's Tool Car Fitted With Motor

The wiremen at the Dresser mine of Walter Bledsoe & Co., Terre Haute, Ind., are provided with motorized tool and material cars which materially ease their work and assure a ready supply of tools and supplies for any normal job underground. The car is fitted with a 1-hp. motor driving one axle through a jack shaft. Current is obtained through a trolley pole, and the movement of the car is controlled by a two-point controller. Car speed is 6 to 7 m.p.h.

Included in the facilities on the car is an open tool rack on one end and a covered tool chest on the other, on which large coils of wire, etc., may be placed for transportation. Weight of the car is about 900 lb., and the secret of its successful operation, mine officials state, is a non-stiff frame made with flexible cross members. Thus, the frame has enough give so that the car stays on the rails at all times. Cost of the car is about $300 made at the mine.

Cleaning Small Parts Easily Done in Several Ways

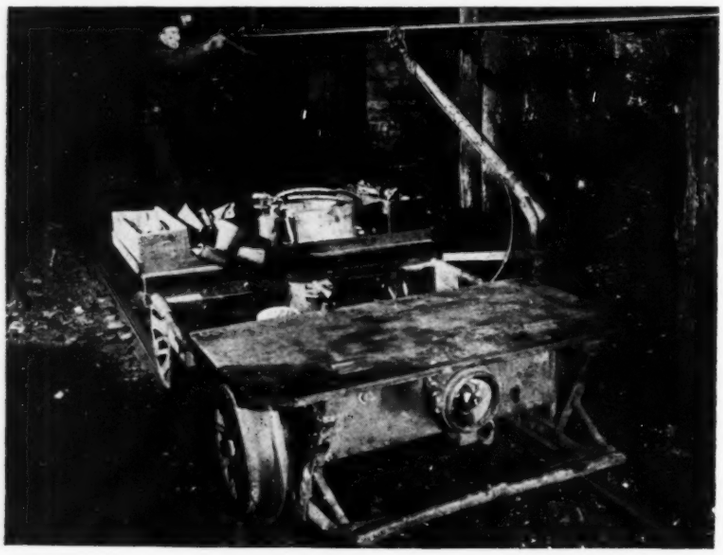
When it is desired to clean a considerable number of small parts by giving them a thorough bath in gasoline, kerosene or other solvent there always is the possibility of loss in addition to the extra time required if each piece is given individual attention, writes John E. Hyler, Peoria, Ill. One way of overcoming this handicap, if the parts are washers, nuts, small bearings, etc., is to string them on a piece of wire or heavy cord, tying the ends together and then sloshing the assembly thoroughly.

If the parts cannot be strung like beads, an old corn popper is a good substitute and may be kept on hand for this purpose. If the parts are to be sloshed around with force, a string may be tied around the popper to make sure it does not come open. Sometimes the parts may be too large or too heavy for the corn-popper method, in which case they may be sandwiched between two pieces of cloth which then are sewn together with twine or light wire to hold the parts in. Lots of parts of considerable size and weight may be handled quickly in this fashion.

Air Duct From Fan Discharge Cools Overloaded Motor

To provide air circulation in the fan motor house at MacBeth (W. Va.) mine of the Hutchinson Coal Co. a wooden duct was built with a funnel-shaped intake facing the discharge opening of the fan. This simple and effective arrangement is shown in the accompanying illustration.

The need for forced ventilation grew out of the use on a new and larger capacity fan of the 100-hp. motor from the old centrifugal fan. The new fan was installed to furnish considerably more air and do it with but little increase in power. The new unit takes slightly over 100 hp. and instead of buying a larger motor the forced ventilation enabled the original motor to carry the necessary overload. The new fan is a Jeffrey 8-ft. Aerodyne unit operating at 820 r.p.m. and delivering 150,000 c.f.m. at a 3.75-in. water gage.



Dresser wireman's car weighs 900 lb. and is motor-driven.

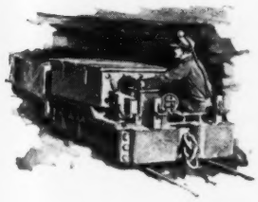
Funnel and duct pick up air for motor cooling.

Hoist-Control Attachment Gives Caging Signal

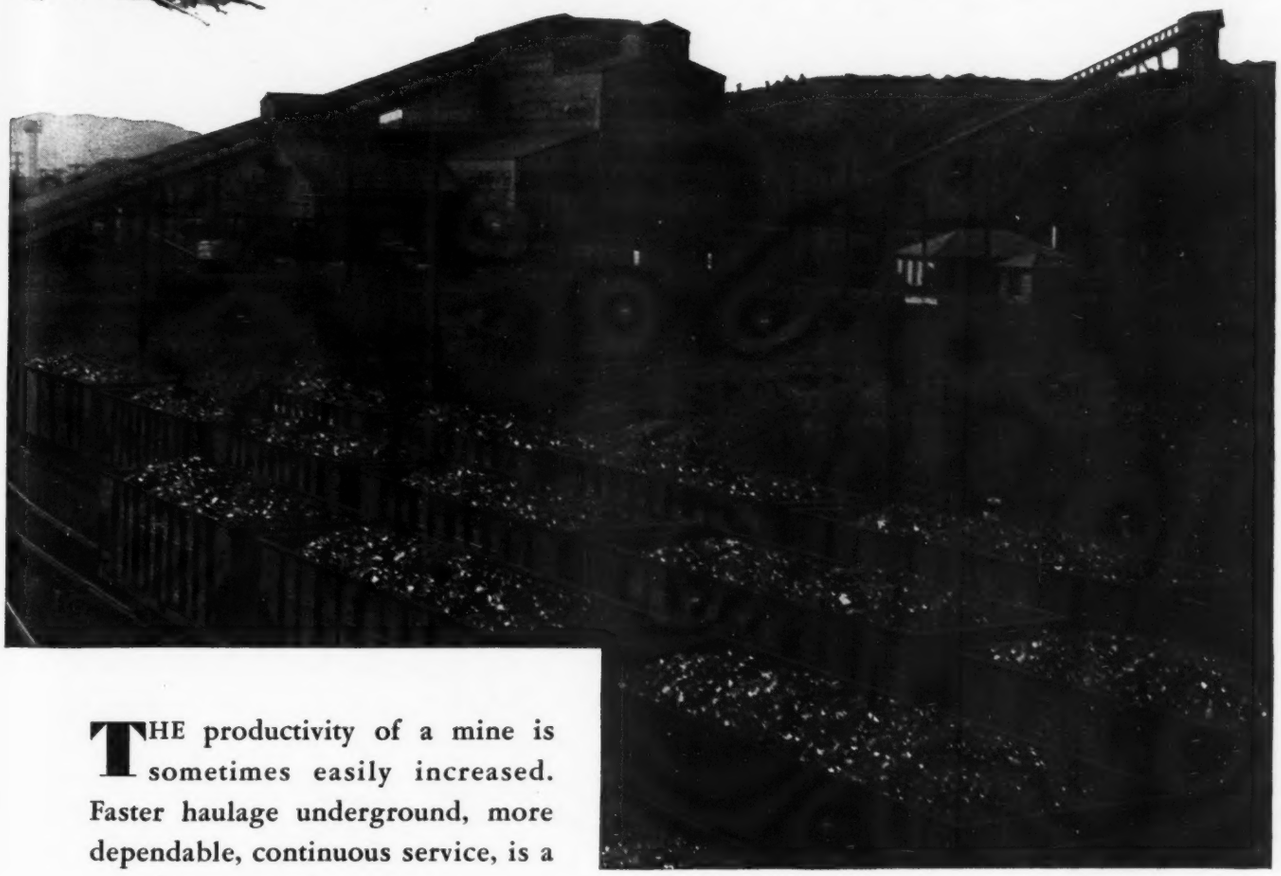
Hoisting 750 4-ton cars with a 250-hp. electric hoist in seven hours over a distance of 290 ft. is aided at the Standard mine of the Standard Coal Co., Wheatland, Ind., where manual caging is the practice, by releasing the individual cars to the shaft upon receipt of a bell signal indicating that the empty car is on its way down and the cage is within the pre-

No Substitute

• There is, we firmly believe, no substitute for the Operating Ideas section of Coal Age. Here, and only here, will you find each month this varied selection of worth-while aids to operating, electrical, mechanical and safety men. Naturally, each and every idea presented herein originated in the brain of some man at the mines, and therefore they get the lion's share of the credit. But cash also is the reward to those men who send in their hints for cutting cost, increasing efficiency or promoting safety. So don't hang onto that idea of yours—it's worth money. Send it in, along with a sketch or photograph if it will help to make it clearer. For each idea which the editors find acceptable, Coal Age will pay $5 or more upon publication.

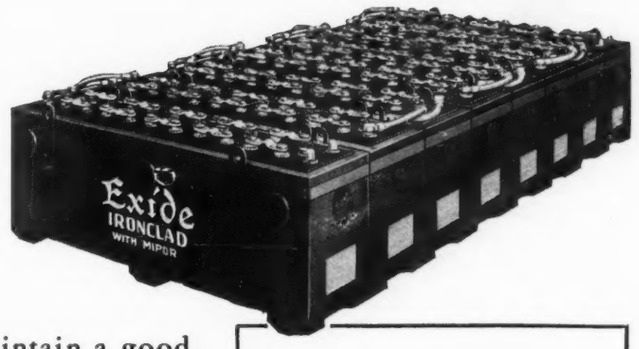


More miles per hour underground mean more tons per day at the tipple



THE productivity of a mine is sometimes easily increased. Faster haulage underground, more dependable, continuous service, is a sound means of producing more coal per day.

Battery locomotives, powered by Exide-Ironclads, provide speedy and trouble-free haulage service. And the reason lies in the exceptional performance of these batteries.



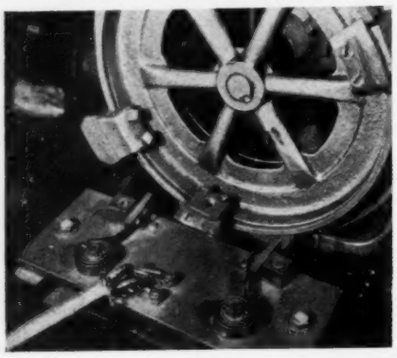
They can deliver almost unlimited power when needed—ample for unusual loads and grades. They maintain a good voltage, hence good haulage speeds, all day. Their dependability minimizes interruptions and delays. And their life is so long that the overall cost is kept exceedingly low.

Write today for free booklet, "The Storage Battery Locomotive for Underground Haulage."

Exide
IRONCLAD
BATTERIES
With Exide **MIPOR** Separators
"MIPOR," Reg. U. S. Pat. Off.

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto

determined safe limits of the bottom. To ring the bell automatically, mine-made cams and one-way-acting contact fingers were added to the Lilly control. The method of making the action one-way was a happy thought involving the adaptation of standard parts available in the mine shop.

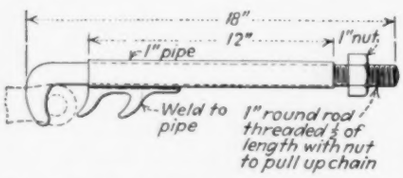


Converter parts are the "mainsprings" of the belling attachment.

In the illustration, the cam at the bottom of the wheel and also that at the upper right are the two which operate contacts to the bells for the respective cages. They brush against fiber blocks fastened to the ends of the coil springs. Rotation in one direction pushes the fiber block against a fiber stop block. Rotation in the other direction moves the block over so that screw heads contact a brass leaf. Thus, a cam bells the bottom only on downward travel of the cage. The springs must be of a type which allows endwise as well as rotative movement of the fiber blocks against which the cams rub. The springs adapted to this service are the a.c. collector-brush tension springs of General Electric converters.

Special Tool Facilitates Joining Chains Together

The tool shown in the accompanying illustration is offered as a convenient means of pulling chains on mining-machine trucks together and holding them until the pins can be put in. Ordinarily,

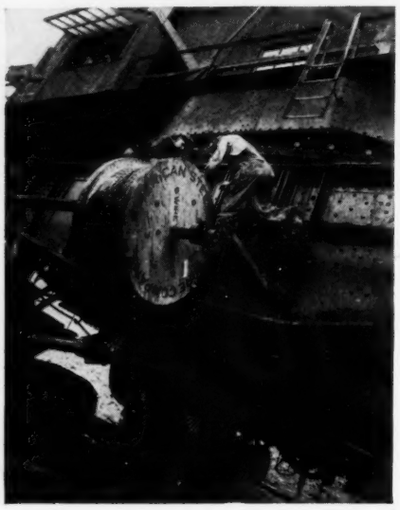


This tool makes joining chains an easy task.

says H. H. Wagner, electrical engineer, Cambria Fuel Co., Holsopple, Pa., this is a difficult task, but the tool herein described makes it easy. The tool also may be used on other chains and in fact, says Mr. Wagner, "I don't know what we would do without it."

Carrying Spare Hoist Rope Cuts Replacement Time

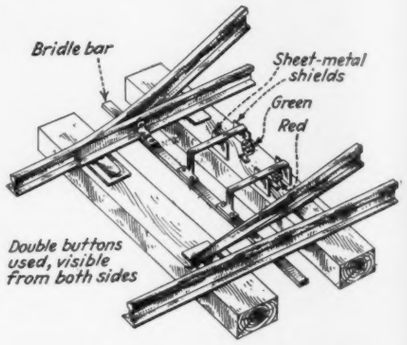
Renewing a hoist rope is one maintenance job which must be repeated at fairly regular intervals on every strip shovel. Unless the expense of operating a shovel is increased by overmaintaining—for instance, renewing ropes before they actually wear to a danger point—the renewals most likely must be made during a working shift or during a working week. At several mines in Indiana the delay time of renewing a hoist rope is cut to a minimum by carrying on the shovel a reel of new rope mounted on an axle ready for unspooling. The illustration shows a stage in a rope-renewal job at the Staunton mine of the Electric Shovel Coal Corporation, Staunton, Ind. The men have taken the cover off the spare rope and are untying the end. The shovel is a Marion 15-yd., Type 5480. Rope size is 2 in. and the length is 400 ft.



A spare rope had been carried so that it would be available for replacement.

Reflector Buttons Show Switch Position

Movable shields are used on the bridle bars of switches to cover and uncover stationary reflector buttons and thus show the position of the latches, according to an idea submitted by J. Peraino, Wheelwright, Ky. The reflector buttons, which are double so that they light up when the locomotive approaches from either direction, are mounted on a tie beside the bridle bar, as indicated diagrammatically in the accompanying illustration. Two double shields are mounted on the bridle bar in substantially the manner shown and their position is adjusted so that when one pair of shields is covering one reflector unit, the other pair is to one side of the other unit. Thus, as the switch points are moved back and forth, first one and then the other reflector unit



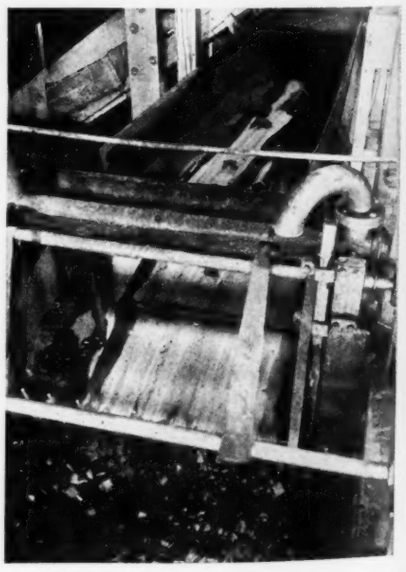
Showing installation of the reflector buttons and how they are covered and uncovered as the switch is thrown.

is uncovered. Mr. Peraino suggests installing the buttons so that the red is exposed when the switch is thrown for the turn, with the green exposed when the switch is lined for the straight. Also, Mr. Peraino points out, no electric power is required for operation and the chance of costly derailments is materially reduced.

Washer Feed Broken Up By Baffles in Chute

To make sure that masses of coal sticking together because of moisture or other reasons do not go into the washing units as a whole, with consequent adverse effects on washing efficiency, baffles are installed in the feed chutes to the Link-Belt Simon-Carves washers at the Friar Tuck preparation plant of the Sherwood-Templeton Coal Co., Linton, Ind. These baffles (see illustration) consist of angles welded to the bottoms of the chutes and staggered so that masses of material cannot slide through between them.

The baffles in the chute break up coal masses before they hit the washer.



TESTS 17 BRANDS OF OIL... PICKS

STANOCYL
STEAM CYLINDER OIL

● SEVENTEEN BRANDS of steam cylinder oil were tested in the power plant of a Central State prison, on two 300 KW steam engines, in an effort to eliminate valve groaning under increased steam pressure and temperature. The only one of the 17 which gave really adequate lubrication was StanoCyl S H.

StanoCyl has been in use, now, two years at this plant. There is every indication that the engines and valves are being lubricated even better than they were before the change to superheated steam was made.

Practically every test of StanoCyl which is made shows lower consumption, cleaner exhaust steam and better lubrication under all steam conditions. It is easy to prove this in your own plant.

The Standard Lubrication Engineer will help make such tests at no expense to you. Find out what *your* saving might be. Write Standard Oil (Indiana), 910 S. Michigan Ave., Chicago, Ill., for the Engineer nearest your plant.

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LUBRICATION ENGINEERING *THE RIGHT LUBRICANT • PROPERLY APPLIED TO REDUCE COSTS*

Excellay *Preformed* Wire Rope reduces equipment operating costs

THE mining field is turning more and more to the use of American Tiger Brand EXCELLAY Preformed Wire Rope because its many advantages can be summed up in a single word — *Economy*.

EXCELLAY Preformed Wire Rope is "relaxed." It is free from the internal stresses present in standard rope. This enables it to withstand fatigue to a greater degree. It does not break up so quickly from abrasive wear. It resists kinking and winds smoothly and easily on the drums, reducing uneven wear and drum abuse. It is easier to splice, easier to install, and safer to handle.

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You can depend upon the wire rope on the Yellow Reel

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UNITED STATES STEEL

WORD FROM THE FIELD

Ruin for Anthracite Industry Seen in St. Lawrence Plan

Ruin for the anthracite industry of Pennsylvania if the proposed St. Lawrence waterway project sponsored by the administration in Washington goes through is foreseen by Louis C. Madeira 3d, executive director of the Anthracite Institute, in a statement issued Jan. 14. "It is gratifying, however, to note," said Mr. Madeira, "that sentiment in Canada extending from high places in the government of the most likely affected provinces down to small merchants and manufacturers is generally opposed to the scheme as uneconomic, unnecessary and unsound."

An influx of foreign coal in ocean-going steamers and an uneconomic flood of oil from Central and South America into Canada and the northern and central parts of the United States, he pointed out, would have the immediate effect of a marked curtailment of the anthracite business now enjoyed in these markets. "This loss," said the director, "would amount to more than the estimated ten to fifteen million dollars each year required for carrying and maintenance charges set up by this questionable project. Millions of man-days of highly paid American labor in the anthracite mines of Pennsylvania would be eliminated. Those employed by railroads in the transportation of anthracite, both in the United States and Canada, would be similarly affected. Sources of taxes would be largely curtailed. It is estimated that the hydro-electric portion of the project would at least wipe out directly in the United States over five million tons of coal and as many man-days of work in mining and transportation.

"Failing of passage by the Senate of the United States in 1934, this revised form of the project, as proposed by the State Department in 1938, is just as fundamentally unsound and objectionable today as it was in 1934. The lack of need, the cost and the ruinous consequences are so obvious that it is inconceivable how any thinking person can entertain the thought of creating this uneconomic project."

Directors of the institute passed a resolution on Jan. 4 opposing the project.

Coal Land Sale Killed

Proposed sale of 44,291 acres of coal lands of the Philadelphia & Reading Coal & Iron Co. to the State of Pennsylvania by Allen Gray Clark, Philadelphia attorney, has been killed, according to an announcement on Jan. 14. Mr. Clark withdrew his offer to sell the land to the State for $198,000, after he had acquired the property at public auction. For the entire tract he paid $59 to the coal company, now in process of reorganization in the Federal courts.

W. J. Jenkins
Mining Congress Program Chairman

A preliminary injunction restraining transfer of the land had been granted in Dauphin County Court on Jan. 10, but the U. S. District Court the following day approved the sale. Counsel for a minority group of bondholders fought the proposed sale in various courts, continuing the battle until the sale was killed. The minority group plan to ask the Federal District Court at Philadelphia to appoint a trustee to operate the company under the Chandler act.

Coming Meetings

- American Institute of Mining and Metallurgical Engineers: annual meeting, Feb. 13-16, 29 West 39th St., New York City.
- Central West Virginia Mining Institute: annual meeting, Feb. 18, Carmichael Auditorium, Clarksburg, W. Va.
- Canadian Institute of Mining and Metallurgy: annual meeting, March 13-15, Chateau Frontenac, Montreal, Que., Canada.
- Lehigh Valley Coal Association: annual meeting, March 23, Bethlehem, Pa.
- American Mining Congress: sixteenth annual coal-mining convention and exposition, April 24-28, Music Hall, Cincinnati, Ohio.
- Second Annual Anthracite Conference: April 28 and 29, Lehigh University, Bethlehem, Pa.
- Mine Inspectors' Institute of America: thirtieth annual convention, June 5-7, William Penn Hotel, Pittsburgh, Pa.

Jenkins Made Program Chairman For A.M.C. Convention

W. J. Jenkins, president, Consolidated Coal Co., St. Louis, Mo., has been named national chairman of the program committee for the sixteenth annual convention of Practical Coal Operating Men and National Exposition of Coal Mining Equipment. The technical sessions and exposition, according to Julian D. Conover, secretary of the American Mining Congress, sponsor of the meeting, will be held, as in former years, in the Music Hall, Cincinnati, Ohio, April 24-28.

Though last year's meeting attracted about five thousand coal-mining men and the intervening period has been a poor one from a production standpoint, convention officials believe that the throngs of a year ago will be surpassed in number. Regional committee meetings—notably of representatives of the coal industry of the two Virginias, at Charleston on Jan. 11, and of Kentucky and Tennessee, at Lexington, Ky., on Jan. 13—brought large turnouts and keen interest in the topics to be discussed at the April convention.

State and district chairmen of the program committee are as follows: Pennsylvania—J. B. Morrow, production vice-president, Pittsburgh Coal Co.; West Virginia—John T. Sydnor, manager of mines, West Virginia Coal & Coke Corporation; Virginia—J. D. Rogers, vice-president, Stonega Coke & Coal Co.; Kentucky—H. L. Richardson, vice-president, West Kentucky Coal Co.; Tennessee—R. L. Wilhelm, general superintendent, New Jellicoe Coal Co.; Ohio—F. A. Jordan, mining engineer, Youngstown Sheet & Tube Co.; Indiana—B. H. Schull, vice-president in charge of operations, Binkley Mining Co.; Illinois—J. M. Johnston, assistant general manager, Bell & Zoller Coal & Mining Co.; Alabama—R. E. Kirk, general superintendent, Tennessee Coal, Iron & Railroad Co.; Southwestern States—C. Y. Thomas, chief engineer, Pittsburg & Midway Coal Mining Co.; Colorado-New Mexico—T. E. Jenkins, president, National Fuel Co.; Wyoming-Montana—D. H. Pape, president, Sheridan-Wyoming Coal Co.; Utah-Washington—Walter F. Clarke, superintendent, Independent Coal & Coke Co.

Processing Plant Fund Asked

An appropriation of $75,000 to construct a smokeless-fuel pilot plant was requested by the State Conservation and Research Foundation in its biennial report to Governor Henry H. Blood of Utah, submitted Jan. 2. The foundation, which was set up by the last Legislature to study coal processing and development of other resources, is headed by J. L. Gibson, dean of the University of Utah school of arts and sciences.

Commission Nears Coordination Goal; Tetlow Reelected Chairman

WASHINGTON, D. C., Jan. 20—With the issuance on Jan. 17 of an order directing producers' boards in Minimum Price Area 1 to begin coordination proceedings here on Jan. 23 for completing proposals for final f.o.b. mine prices and marketing rules the National Bituminous Coal Commission is nearing the homestretch in its task of establishing prices. The prices and rules as originally proposed by the boards, and modified by the Commission where warranted by evidence received in public hearings, have been approved by the Commission for the purpose of coordination. The latest order gave the Eastern boards until Feb. 15 to complete their work. The area's prices and rules will cover bituminous coal produced in Pennsylvania, West Virginia, Ohio, Maryland, Virginia, Michigan, eastern Kentucky and northeastern Tennessee.

In the coordination proceedings the proposed f.o.b. mine prices will be adjusted by the board representatives wherever necessary to reflect relative market values at points of delivery, to preserve fair competitive opportunities, and to meet other requirements of the Guffey-Vinson act. Following this step the Commission will conduct a final hearing before making the schedules and rules effective.

The work of coordination for coal destined for markets in which they commonly compete is under way between boards for Districts 16, 17, 18, 19 and 22—the Rocky Mountain areas—and the board for District 15—Missouri, Kansas, Texas and part of Oklahoma. The Rocky Mountain and Pacific Coast boards have completed coordination of prices and marketing rules between themselves for markets within their own boundaries, except for certain differentials between the two Colorado districts for coal destined for the Denver market, which are being considered by a board of arbitrators. District 14—Arkansas and certain eastern Oklahoma counties—has completed coordination with the Rocky Mountain boards and with District 15.

The Commission is working on findings of facts and conclusions for the modification or approval of minimum prices and market rules for Minimum Price Area 2—Indiana, Illinois, Iowa and western Kentucky. When these are completed, proposed prices and marketing rules for the entire country will have been approved for the purpose of coordination.

Report Cites Knotty Problems

In its annual report to Congress on Jan. 22 the Commission stated that the soft-coal industry was losing money at the rate of $37,000,000 a year in 1937, and that all signs since then pointed "to an increase in the operating deficit of the industry. Such a situation, if allowed to continue, cannot but have grave social consequences. The money losses suffered by the mine operators are obvious and they lead to widespread bankruptcy, impoverishment of mining communities, shrinkage in local tax revenue, and increased dependence on public relief."

The task of the Commission in safeguarding the rights of all parties, the report said, called for fact-finding determinations involving 7,000 code members and about 90,000 cost reports. This work, it added, must be done "with care, patience and accuracy properly expected in findings that affect property rights. The legal requirement that all interested parties are entitled to a full and fair hearing necessarily consumes time. To apply these well-established principles of fair hearing and orderly procedure in so large and scattered an industry raises new problems in public administration."

The Commission's estimate of average loss by the industry in 1937 was 11c. per ton; United Mine Workers officials placed the loss for 1938 at 15c. per ton. The Commission expected its determinations to result in the establishment of minimum prices that would permit the industry to "obtain an average income equal to its average cost."

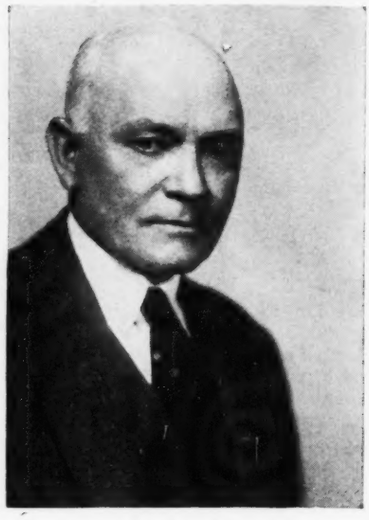
The Commission announced on Jan. 13 that it had determined that the underlying coal in 37 Montana counties is bituminous and therefore subject to the coal act. In eight other counties it was decided that the coal is lignite and as such exempt from the act. Investigation of the coals of six other counties has been reopened to obtain sufficient evidence upon which to determine the character of the coal.

The counties in which the coal was declared to be bituminous are: Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Cascade, Chateau, Deer Lodge, Fergus, Flathead, Gallatin, Glacier, Golden Valley, Granite, Hill, Judith Basin, Jefferson, Lewis and Clark, Liberty, Madison, Meagher, Missoula, Musselshell, Park, Petroleum, Powell, Phillips, Pondera, Ravalli, Rosebud, Silver Bow, Stillwater, Teton, Toole, Treasure, Wheatland and Yellowstone. The counties in which the coal was found to be lignite are: Daniels, Dawson, Fallon, Richland, Roosevelt, Sheridan, Valley and Wibaux. Investigation was reopened for Carter, Custer, Garfield, McCone, Powder River and Prairie counties.

Twelve Montana producers were granted exemption from the act, their product having been found to be lignite. Permission has been given by the Commission to 34 producers in seven other States to withdraw applications for exemption. Releases had been sought on the grounds that the producers sold their output entirely within the confines of their respective States and that it did not affect interstate commerce in coal. These producers operate in the following States: Pennsylvania, 15; Colorado, 5; Illinois, 3; Indiana, 3; Missouri, 3; Michigan, 3; and Alabama, 2.

Edward L. Carr, assistant to the president, Bell & Zoller Coal & Mining Co., was unanimously elected on Jan. 5 to membership on the District 10 (Illinois) Producers' Board, succeeding George W. Reed, vice-president in charge of sales of the Peabody Coal Co., resigned (*Coal Age*, January, p. 72).

The U. S. Supreme Court on Jan. 3 heard the petition of the Utah Fuel Co. and 21 other coal companies for reversal of the lower Federal courts in the District of Columbia in denying an injunction against disclosure by the Commission of individual producers' cost data. In his argument for the producers J. V. Norman took exception to the Commission's reliance on Sec. 10 (a) of the coal



Percy Tetlow
Unanimously reelected chairman of the National Bituminous Coal Commission

Keeping Step With Coal Demand

Bituminous Production

	1938 (1,000 Tons)	1937 (1,000 Tons)
December 3	8,615	8,267
December 10	8,188	10,304
December 17	8,120	9,210
December 24	8,400	6,429
December 31	7,872	6,115
January 7	7,648	6,115
January 14	8,050	7,605
Total to December 31	342,407	442,455
Month of November	**36,110**	**36,428**
Month of December	**36,230**	**37,122**

Anthracite Production

December 3	1,188	849
December 10	973	1,130
December 17	943	1,216
December 24	1,024	941
December 31	994	988
January 7	915	1,824
January 14	990	1,263
Total to December 31	45,054	51,856
Month of November	**3,728**	**4,439**
Month of December	**4,471**	**4,759**

Bituminous Coal Stocks

	(Thousands of Net Tons) Dec. 1 1938	Nov. 1 1938	Dec. 1 1937
Electric power utilities	8,416	8,195	8,956
Byproduct coke ovens	7,173	6,459	8,115
Steel and rolling mills	650	620	1,256
Railroads (Class 1)	5,315	5,052	6,820
Other industrials*	11,771	10,998	14,863
Total	33,325	31,324	40,010

Bituminous Coal Consumption

	(Thousands of Net Tons) Nov. 1938	Oct. 1938	Nov. 1937
Electric power utilities	3,525	3,575	3,433
Byproduct coke ovens	4,622	4,360	4,573
Steel and rolling mills	803	736	839
Railroads (Class 1)	6,597	6,663	7,103
Other industrials*	9,369	8,400	10,933
Total	24,916	23,734	26,883

* Includes coal-gas retorts and cement mills.

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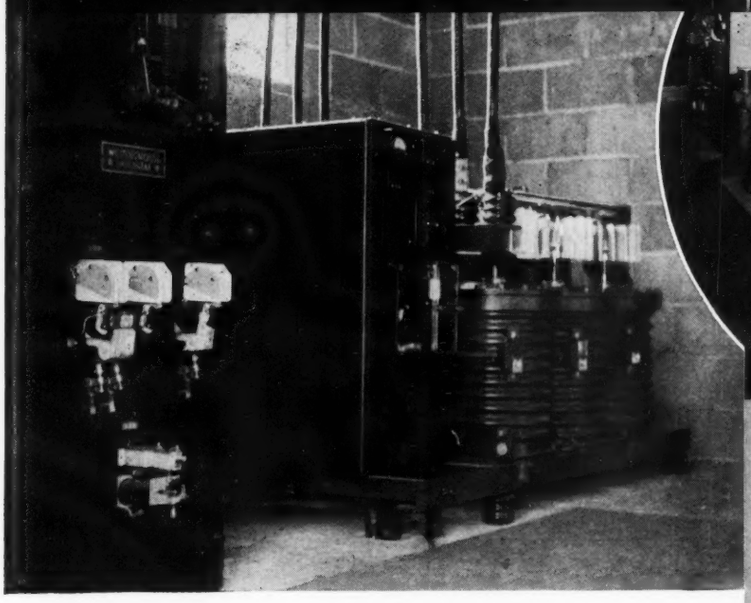

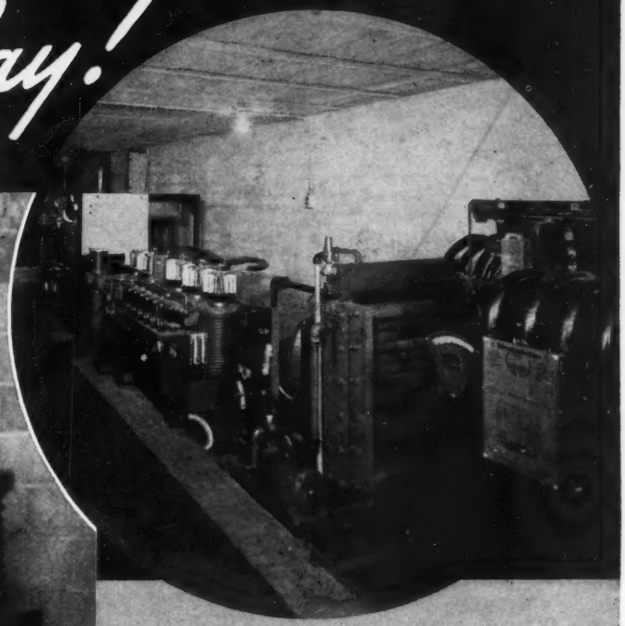

Leading operators select Westinghouse Ignitron Rectifiers for lower power costs

Power conversion by the Westinghouse Ignitron opens the way to new low costs for power underground. Modern mines, like those listed below, are using Ignitron Rectifiers because their higher efficiency at all loads cuts power consumption and lowers the maximum demand.

Automatic in operation, they reduce costs. Also, their high overload capacity makes them ideal for mining service. Reorders testify to the success of these Westinghouse Ignitron Rectifiers.

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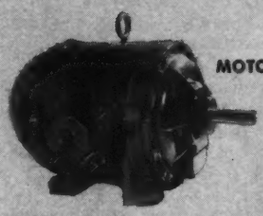
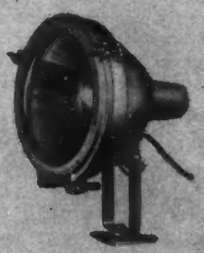
A FEW TYPICAL PRODUCTS IN THE COMPLETE WESTINGHOUSE LINE FOR THE MINING INDUSTRY.



MOTORS



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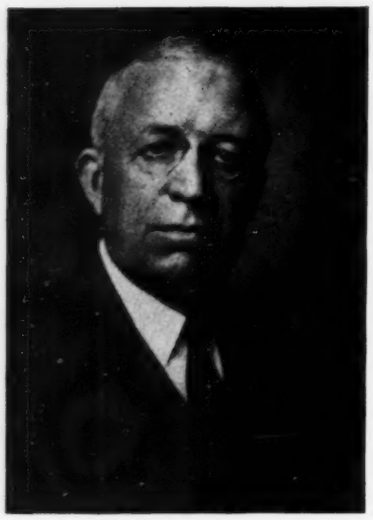

Robert H. Gross

Newly elected president of the New River Co.

act, which states that the data should not be revealed "except where such disclosure is made in evidence in any hearing before the Commission or any court." He maintained that the Commission's construction of this exception as permitting it to reveal such data in evidence at a hearing would destroy the intent of the act. For the Government, R. H. Jackson, Solicitor General, said that, although the impression may have been conveyed that this information would be held confidential, in any event it has no privilege under the law. "If the act cannot work in public, in the open," he asserted, "then it can never work at all, it seems to us."

Provisional approvals as marketing agencies were granted by the Commission to the Western Pennsylvania Coal Corporation, Pittsburgh, on Dec. 22, and to Fairmont Coals, Inc., Fairmont, W. Va., on Jan. 6. The former was organized last July with J. O. Smith, formerly of Appalachian Coals, Inc., and later with the marketing division of the National Bituminous Coal Commission, as president (*Coal Age*, September, 1938, p. 62). The Fairmont agency was formed about the same time with Dr. Stephen P. Burke, director of technical research Consolidation Coal Co., at its head. Application for approval as a marketing agency has been filed with the Commission by Arkansas-Oklahoma Smokeless Coals, Inc.

With the election of officers, Southern Illinois Coals, Inc., which has received provisional approval as a marketing agency (*Coal Age*, January, p. 78), has begun to function. E. R. Keeler, president, Franklin County Coal Corporation, is president of the agency; G. Donald Cowin, president, Bell & Zoller Coal & Mining Co., is vice-president; Harry Stuart, formerly secretary of the Southern Illinois Bureau, is secretary-treasurer, and W. Y. Wildman, who was director of the Illinois Coal Traffic Bureau prior to passage of the Guffey-Vinson act, is chairman of the marketing division of the agency. Taking the place of the Southern Illinois Bureau, which has been disbanded, the new organization has taken over the old one's Chicago offices.

Coal Industry Supports Bill To Boost Fuel-Oil Tax

Unqualified and unanimous support by the coal industry, both producers and miners, will be given a bill to increase the excise tax on imported petroleum oil to 3c. per gallon introduced in the House of Representatives on Jan. 3 by Representative Joe L. Smith of West Virginia, according to an announcement by John D. Battle, executive secretary of the National Coal Association. The inflow of foreign crude and fuel oil at the rate of a million barrels a week, principally from Venezuela and the West Indies, said Mr. Battle, "is a large contributing factor in the displacement of coal, shrinkage of tonnage and unemployment within the coal industry that has been so manifest during the past year. The removal of this impediment to the recovery of our industry is one of the major points in our recovery and market-promotion program now in progress.

"Congress in 1932 imposed an excise tax on certain categories of imported petroleum oil at the rate of ½c. per gallon. The rate of this tax was so low and the exceptions so many that it has wholly failed to check oil importations, which are as large or larger now than previously. This tax is in the group of special excises that, as the law now stands, expire by limitation next June 30. For Congress simply to continue it at the present rate will fall far short of meeting the self-evident needs of the situation."

Herbert C. Moore

The president of the newly formed Kentucky Coal Agency, Inc., was born in Whitesburg, Tenn., in 1895, was educated in Carson and Newman College and started his business career in the traffic department of the Southern Ry. Later he became part owner of a coal mine in southeastern Kentucky, then entered the mine and mill supply business, resigning to engage in the wholesale and retail coal trade. He also served as a member of the code authority of Division No. 20 (State of Tennessee) of the retail solid fuel industry under NRA. He joined Appalachian Coals, Inc., in 1933, remaining until passage of the first Guffey Coal Act (1935), when he joined the staff of the Coal Commission at Washington, D. C., as chief investigator. He rejoined A.C.I. when the first coal control act was invalidated, serving first as a special representative and recently as a member of the marketing division staff.

Walter M. Dake

Dake Made Managing Editor

Walter M. Dake, for the past two years research manager of the McGraw-Hill mining publications, has been appointed managing editor of *Coal Age*, effective Feb. 1. Mr. Dake needs no extended introduction to the coal-mining fraternity. His past experience includes operating in the Rocky Mountain States; private consulting engineering practice; administrative assistant, engineering division, U. S. Coal Commission; consulting engineer in charge of sales, Joy Manufacturing Co.; special government consultant in the WPA-Bureau of Mines studies in replacement of man-power in the mining industry, and associate editor, Peele's Mining Engineers' Handbook.

Personal Notes

H. H. AGEE has been appointed superintendent at Mullens mine of the Mullens Smokeless Coal Co., Mullens, W. Va.

GEORGE F. BARNARD has been made superintendent at Long Branch No. 1 mine of the Koppers Coal Co., Long Branch, W. Va.

CHARLES BELL has been named mine foreman at the Hitchman mine of the Hitchman Coal & Coke Co., Benwood, W. Va.

C. L. BIDDISON has been appointed superintendent at the Lemoyne and Sandy McGregor mines of the Ward-Hoyt Mining Co., Bickmore, W. Va.

GEORGE C. BRANNER, State Geologist of Arkansas since 1923, has been reappointed by Governor Carl Bailey for another two-year term.

FRANK C. CAROTHERS has been made general manager for the Puritan Coal Corporation, Puritan Mines, W. Va.

WILLIAM COBISKEY has been named mine foreman at Pursglove No. 5 mine of the Pursglove Gas Coal Corporation, Pursglove, W. Va.

W. T. CRAFT has been appointed mine foreman at the Sandy McGregor mine of

F. S. Follansbee

the Ward-Hoyt Mining Co., Bickmore, W. Va.

WILLIAM DOVER has been made mine foreman at the Mullens mine of the Mullens Smokeless Coal Co., Mullens, W. Va.

ROBERT G. DRINNAN, who for the last sixteen years has been managing director of Luscar Coals, Ltd., operating at Luscar, Alberta, and of Mountain Park Coals, Ltd., operating at Mountain Park, Alberta, and both having offices at Edmonton, has resigned those positions but will continue as vice-president of both companies.

HENRY H. ELKINS has been named safety director for the Keith Coal Mining Co., Keith, W. Va.

F. S. FOLLANSBEE, since 1923 chief engineer for the Koppers Coal Co., has resigned, effective Jan. 1, to become chief engineer for the Pittsburgh Coal Co. On leaving the Colorado School of Mines he joined the United States Coal & Coke Co., Gary, W. Va., in 1915, transferring six years later to the New England Fuel & Transportation, Grant Town, W. Va., where he remained until joining the Koppers organization. Officers of the Koppers and Pittsburgh Coal companies attended a dinner for Mr. Follansbee on Dec. 29 in the William Penn Hotel, Pittsburgh, Pa.

W. J. HINES has been appointed superintendent at Micco No. 3 mine of the West Virginia Coal & Coke Corporation, Switzer, W. Va.

WILLIAM C. HOOD, who for the last year has been general superintendent for the United States Coal & Coke Co. at Gary, W. Va., a United States Steel subsidiary, has been made general superintendent for the H. C. Frick Coke Co., Scottsdale, Pa., another Steel Corporation subsidiary. He succeeds CLAY F. LYNCH, resigned. Mr. Hood has been with the Frick or associated companies since 1897. CHARLES J. MAHER continues as assistant general superintendent of Frick operations.

HARRY B. JONES has been made mine foreman at the Skelton mine of the New River Co., Skelton, W. Va.

EMIL B. KEENAN, formerly preparation engineer for the American Rolling Mill Co. mines at Nellis, W. Va., has accepted a similar position with the United States Fuel Co., Salt Lake City, Utah. His headquarters will be at Hiawatha.

JOHN KYLE has been named mine foreman at Leevale No. 2 mine of the Leevale Collieries Co., Leevale, W. Va.

ROBERT W. LEA resigned from the presidency of the West Virginia Coal & Coke Corporation on Jan. 18 and was elected vice-president of the Johns-Manville Corporation, New York City. He will be in charge of finance. He was formerly president of the Moline Implement Co., vice-president of the Stephens Motor Car Co., president of the Hammond Lumber Co. and administrative assistant of the NRA in Washington, D. C.

ROBERT LIVINGSTONE, for many years general manager of Lethbridge Collieries, Ltd., Lethbridge, Alberta, has retired.

JOHN C. LOWRY, JR., formerly with the West Virginia Coal & Coke Corporation, has accepted a position as mining engineer for the Pritchard interests, of Charleston, W. Va.

HARRY N. MEADE has been elected president of the Mullens Smokeless Coal Co., Mullens, W. Va.

J. L. NELSON has been appointed mine foreman at the Echo mine of the Woodsdale Fuel Co., Wheeling, W. Va.

L. T. PUTMAN, general superintendent, Raleigh-Wyoming Mining Co., Beckley, W. Va., has been elected president of the Winding Gulf Operators' Association. Other officers named are: vice-president, J. A. HUNT, vice-president and general manager, Lillybrook Coal Co.; secretary-treasurer, P. C. GRANEY; assistant secretary, HAL M. SCOTT.

JAMES A. RICHARDS, assistant chief inspector of mines for the Province of Alberta, Canada, withdrew from that post as of Dec. 31.

J. P. ROUTH, formerly president of the J. P. Routh Coal Corporation, New York City, was elected chairman of the board of the Pittston Co., anthracite producer, Scranton, Pa., on Jan. 13. This is the result of reorganization activities by Robert R. Young and associates.

William C. Hood

William Roy, Sr.

WILLIAM ROY, SR., retired as safety director of the Hanna Coal Co. of Ohio as of Jan. 1. Safety work hereafter will be under the direction of each mine superintendent, aided by operating staffs and mine worker committees.

WILLIAM ROY, JR., has been appointed director of the compensation department of the Hanna Coal Co. of Ohio, with headquarters in St. Clairsville, Ohio.

CHARLES M. SHINN, who has been assistant chief engineer for the Dawson Coal Co., Clarksburg, W. Va., for the last two years, has been named division engineer for the Consolidation Coal Co.'s West Virginia division with headquarters at Fairmont, W. Va.

E. S. SMALLMAN has been appointed mine foreman at Long Branch No. 1 mine of the Koppers Coal Co., Long Branch, W. Va.

RODERICK STEPHENS, coordinator of the Retail Solid Fuel Industry of New York, announced his resignation from that post on Jan. 18 to become executive manager of a group of retail coal companies in New York City and nearby New Jersey. The new set-up combines nine companies, though each retains its identity. The companies affected are the Stephens Fuel Co. (of which he was formerly president), Owens & Co., Central Coal Co. of New York, Greason Sons & Dalzell, Fleer Bros. Kerner Coal Co., Prospect Coal Co., Jagels A Fuel Corporation, and the Central Coal Co. of New Jersey.

G. J. STOLLINGS, general manager of the Mallory Coal Co., Mallory, W. Va., has also been made general manager of the Pond Creek Pocahontas Co., an associated organization, at Bartley, W. Va.

G. W. SUTHERLAND has been named mine foreman at the Lemoyne mine of the Ward-Hoyt Mining Co., Bickmore, W. Va.

JOHN IRA THOMAS, Philipsburg, Pa., was appointed Secretary of Mines of Pennsylvania by Governor James on Jan. 16. Mr. Thomas, who succeeds the late Michael J. Hartneady, was at one time an inspector in the bituminous region of the State and subsequently served for

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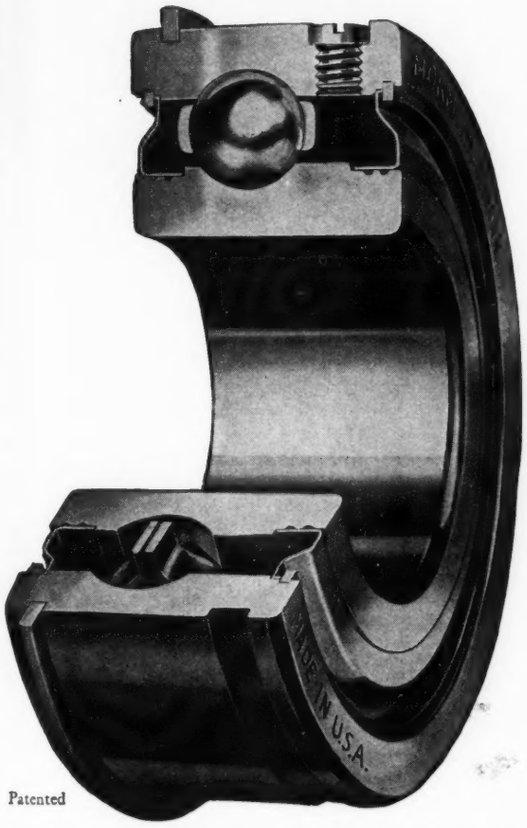

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Ideal Self-Sealed Bearing

Can be packed with at least 100% more grease than any other self-sealed bearing—especially adapted, therefore, for continuous service for long periods.

Eliminates the dirt hazard and insures absolute retention of lubricant—by the use of flanged metal shields, recessed inner ring construction and two or more grease grooves, the combination affording a truly effective labyrinth.

Is equally efficient in retaining grease in horizontal or vertical position.

Flanged metal shields, though rigidly located by snap rings, are removable to facilitate inspection, cleaning or re-greasing of bearing.

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Requires no lock nuts on shaft or clamping means in housing, because of wide contact areas due to double-row width of both rings—which also safeguard against "cocking" and prevent slippage or "peening".

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Reduces costs by simplifying design, eliminating protective closure parts, and saving attendant labor.

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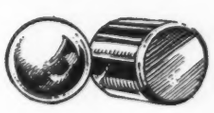


about six years as Deputy Secretary of Mines in that field.

R. H. TINSLEY has been made superintendent at the New Howard mine of the Dayton Coal Corporation, Surosa, W. Va.

Locals Seek Joint Parley With Progressives

Representatives of 25 Illinois local unions of the United Mine Workers early in January invited members of the rival Progressive Miners union to discuss jointly a new wage contract to replace the present one, which expires on March 31, at a meeting on Jan. 22 at Herrin. The invitation was extended in a resolution adopted by officials of local unions in Saline, Williamson, Franklin and Perry counties. The resolution read, in part: "We all know as long as we stand divided that it will be very difficult for us to obtain from our employers due compensation for our labor and conditions that our people rightfully deserve."

Ray Edmundson, Illinois U.M.W. president, said he was "in hearty accord" with the move. He declared that the resolution expressed the wishes of about 15,000 members in the 25 locals and was a "frank and clear statement on the desire for unity in the coal fields of Illinois in order that a unified front might be presented to the coal operators."

On the other hand, Joe Ozanic, president of the Progressive union, said that members of his group who attended the meeting would be acting without authority.

Meetings were held in New York City during the third week in January by delegates of the various operators' associations comprising the Appalachian wage conference to set up machinery for negotiation sessions. The conference adopted a resolution on Jan. 18 recommending that a negotiating committee of sixteen be named from the Appalachian area with full power to negotiate, or cause to be negotiated, a wage contract. The committee was directed to report to the operators' representatives on or before Feb. 21.

Bombers' Penalty Reduced

Conviction of 34 members of the Progressive Miners in the Springfield (Ill.) bombing conspiracy case was affirmed Jan. 17 in the U. S. Circuit Court of Appeals in Chicago, but the penalty was reduced. Thirty-four of the 36 convicted a year ago (*Coal Age*, January, 1938, p. 104) appealed from the verdict of a Federal District Court jury and the sentences and fines prescribed by Judge Charles G. Briggle.

Each defendant was sentenced originally to two years' imprisonment and fined $10,000 for conspiracy to obstruct the mails and to a year in jail and a fine of $5,000 on each of two counts in Sherman antitrust act indictments. The prison sentences were to run consecutively. The appellate court modified Judge Briggle's order, making the sentences a maximum of two years and decreeing that the payment of one $10,000 fine should be considered payment of all fines assessed.

Another "Ghost" Coal Village Crumbles In March of Industrial Progress

WHAT happens to mining communities where the operations around which they were built lags behind in the march of industrial progress? The story of one such town in eastern Ohio is pointedly told in a recent issue of *Hanna Coal News*, the lively monthly published by Hanna Coal Co. for circulation among its employees.

"Another 'Deserted Village,' a remnant of the horse-and-buggy days," says this story, "is being literally removed from the landscape down in the hills of Belmont County's coal-mining regions. Ironically enough, the name of the village is Provident. Its decline came ten years ago when mechanical mining first came into being and transferred the old-fashioned mine camp to the refuse pile along with tons and tons of discarded slag and stone.

"This fall [1938], the entire town, still inhabited by scattered families of the other age, was sold under the hammer. It is being discarded—wrecked, like a hand of cards after the game is over. Soon nothing will be left of the homes of 500 people except the empty foundations and trees and an occasional outbuilding. And the peculiar thing about it all is no one seems to care. Long ago, most of the active miners and citizens had moved 'uptown,' in the residential section of the county seat at St. Clairsville and other villages where they live in cozier, happier, more desirable surroundings that the mechanical age brought them.

This used to be the wash house where 600 men entered every day. The sign on the sagging door tells the story.

"John Kovach, 42, himself once a miner early in life, when he came to this country from Hungary, bought the town of Provident and is tearing it down for junk. Junking towns is nothing new to Kovach, now a successful real estate dealer, because in the last ten years Kovach has disposed of eight other mine villages containing hundreds of homes.

"Joe Joker, a resident, whose home was torn down, commented: 'Kovach provided me with another house better than the one I used to live in. People here will be better off when Provident is done—there was not any advantages here anyway.'

"A total of 82 residences, four business places, a church, several garages, the remains of the Clarkson Coal Co.'s huge and once modern tipple, boarding house, wash house and other buildings compose the village of Provident. The town was once prosperous with more than 600 miners working and living in the neighborhood.

"Ever since ten or eleven years ago, Provident mine has been down and the village started to deteriorate. The mine went bankrupt and last month [November, 1938], after years of waiting for better times, the town was sold to Kovach and the junking process started—the final answer to a cause that lagged behind in the march of industrial progress."

Boost World's Fair Plans

A move for widespread public participation in an exhibit at the New York World's Fair was started at the Fair Grounds on Jan. 12 as a group of 96 business and civic leaders from the Pennsylvania anthracite-producing region voted unanimously to raise a fund of $150,000 to augment the fund already contributed by the operators through Anthracite Industries, Inc. Frank W. Earnest, Jr., president of Anthracite Industries, Inc., presided at a luncheon meeting with Grover A. Whalen, president of the World's Fair Corporation, at which plans were discussed.

It was decided to place anthracite exhibits in the Home Materials Building and in the "Town of Tomorrow." The first named is adjacent to one of the main Fair entrances and the latter, located directly opposite, will be a community of model homes containing the most modern equipment. To further the plans a region-wide group known as "Anthracite Boosters" is being organized to cooperate with Anthracite Industries, Inc., in the campaign.

Glen Alden Quits Price Pact

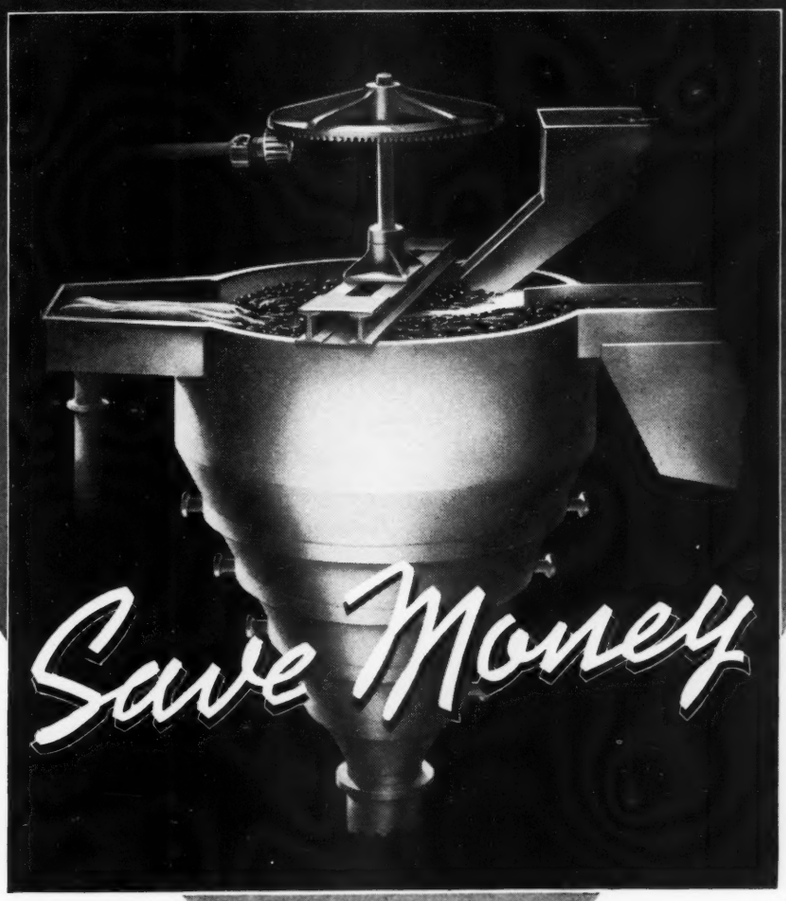
The Glen Alden Coal Co., Scranton, Pa., withdrew on Jan. 19 from the open-price filing agreement under which the anthracite industry has been operating. The company explained that the pact, through lack of proper support, has not been conducive to improved conditions in the industry.

Adopted as a stabilizing measure, the

CHANCE SAND FLOTATION PROCESS

for

CLEANING BITUMINOUS COAL



COAL FLOATS—REFUSE SINKS

—

THERE ARE NO MIDDLINGS

We invite your inquiries and offer the use of our engineering service without any obligation to you.

UNITED ENGINEERS & CONSTRUCTORS INC

NEW YORK PHILADELPHIA CHICAGO

MAXIMUM RETURN TO CLIENTS PER DOLLAR EXPENDED

agreement began operation on Jan. 31, 1938, under the direction of a coordinating committee headed by A. E. Sloat, vice-president, Lehigh Valley Coal Sales Co. (*Coal Age*, March, 1938, p. 79). This was later displaced by an advisory committee under the chairmanship of H. A. Smith, president, Delaware, Lackawanna & Western Coal Co., which retained the management engineering firm of Stevenson, Jordan & Harrison to administer the pact (*Coal Age*, June, 1938, p. 78).

Alabama Rates Extended

Authority to continue for an indefinite period the increased rates on Alabama coal moving in intrastate commerce, ranging from 3 to 8 per cent, authorized in January, 1938, has been granted to Alabama railroads by the State Public Service Commission. The increases were to have expired on Dec. 31 last.

Another Bootleg Peril

Dangers of mine fires, according to Louis C. Madeira 3d, executive director, Anthracite Institute, "are another result of the activities of coal thieves or bootleggers of Pennsylvania anthracite. Now added to the millions already lost and the expense of rescue work supplied by the coal companies when the thieves become entombed in their poorly excavated bootleg holes, the coal operator must literally 'dig out' fires started near the surface.

"Recently a surface fire started by bootleggers was brought under control by a coal company after nearly 24 hours' work with a large crew and a power shovel which had to be rushed from a distant point to the scene of the fire. To prevent a recurrence a patrol was established at the spot. Until law enforcement comes in Pennsylvania these fires can again occur, and are a constant danger, particularly in the winter months."

Obituary

FREDERICK LEONARD SCHOEW, 72, former coal operator in southern West Virginia, died Feb. 20 of a heart ailment. Arriving in this country from Westphalia, Germany, at the age of 19, he was employed for two years by the Pennsylvania Geological Survey, and later was employed by a number of companies in the Pocahontas field as mining engineer. Later he organized the New Howard Coal Co., Huntington, W. Va., of which he was president until 1932.

JOHN H. JOHNSON, 52, mine manager at Superior No. 4 mine of the Superior Coal Co., Gillespie, Ill., died Jan. 2 following a stroke and cerebral hemorrhage. He had been mine manager at No. 4 since Dec. 1, 1925.

EDWIN D. LOGSDON, 71, at one time president of the Knox Consolidated Coal Co., Indianapolis, Ind., died in that city on Jan. 1. Some years previous to his connection with the Knox organization, he organized his own company and was one of the organizers of the Indiana Bituminous Coal Operators' Association.

Edward Graff

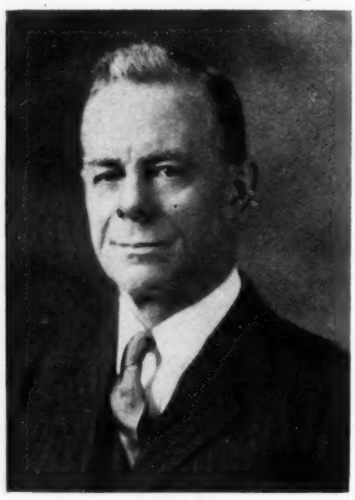
Former general manager, New River Co., who has been advanced to vice-president in charge of operations.

Fire Destroys Tipple

Fire on Jan. 8 destroyed the tipple of the Kentucky Boone Coal Co., at Combs, Ky., operated by the Columbus Mining Co. The loss was $40,000, about half covered by insurance.

Phil Penna Passes Away

Philip H. Penna, 80, long prominent in the coal industry of Indiana, died Jan. 5 at his home in Terre Haute, Ind. A protégé of John Mitchell, predecessor of John L. Lewis as president of the United Mine Workers, Mr. Penna was president of the Indiana U.M.W. for many years. Eventually he became associated with coal producers, being made secretary of the Indiana Bituminous Coal Operators' Association. He also served for about nine years as director at large of the National Coal Association and was a member of many important committees of N.C.A. until his retirement several years ago.



Philip H. Penna

Alabama Mining Interests Cite Threat of TVA

More than 20,000 persons will lose their means of livelihood if the menace of the Tennessee Valley Authority becomes a fact and the Alabama coal industry is deprived of markets for about 1,000,000 tons of coal purchased annually by Southern public utilities, according to a statement made late in December by the Alabama Mining Institute to the Congressional joint committee in Washington investigating TVA. Those who will be made jobless include not only coal miners but those employed by the railroads in transporting coal and those engaged in plants generating electricity by steam power. Many employees of industries serving the coal industry and other persons dependent wholly or in part for their livelihood on the coal industry, says the brief, also will be adversely affected.

Citing coal purchases by the Alabama Power Co. for its Gorgas steam plant in Walker County, as an example, the statement revealed that production of coal for this company alone required the employment of 1,000 men working five days a week for five months. It was pointed out that 80 per cent of the relief roll in this county, in the heart of the State's richest coal area, consists of former coal miners.

It also is contended that the threat of TVA has, by making it impossible for coal producers to raise funds for the purchase of equipment, retarded progress in the modernization of Alabama coal mines, so that they find it more and more difficult to survive under the burden of increased wages and reduced working hours.

The Alabama U.M.W. also adopted a resolution at its annual convention in Birmingham on Jan. 19 calling on the State Legislature to place a tax on natural gas, crude oil and hydro-electric power. The resolution deplored the fact that such laborless fuels have made great inroads on coal production in that State and urged that it be protected by adequate taxes on all forms of competing fuels.

Orders Hard-Coal Rate Boost

An order to the anthracite-carrying railroads in Pennsylvania to put into effect on Feb. 10 higher rates on intrastate shipments of hard coal was issued by the Interstate Commerce Commission on Jan. 6. The new rates found to be reasonable were announced in a decision in Docket 28,050 released by the Commission late in November (*Coal Age*, January, p. 72).

North Carolina Mine to Reopen

Coal mining will be resumed soon near Sanford, N. C., it has been announced by the new owners of coal properties there. Dewatering of the shafts of the old Carolina Coal & By-Products Co. was to begin in January by interests that have bought the property. About 2,500 acres of land, including the old mine plant, has been acquired and a 25-year lease taken on 5,000 acres adjoining. The new operating corporation is the Carolina Fuel & Trans-

(*Turn to page* 100)

DEPENDABLE

THIS ALUMINUM FOIL SHIELDED SHUNT comprises an outer layer of thin aluminum and an inner layer of highly efficient insulating material. It holds the leg wires tightly together for their entire bared length, thus forming a complete short circuit. The insulating layer protects the short-circuited ends from outside currents. To remove the shield, simply pull the leg wires apart.

DU PONT
ELECTRIC BLASTING CAP
WITH
ALUMINUM FOIL SHIELDED SHUNT
FIGURE 8 FOLD AND BANDED

THIS PAPER BAND holds the cap wires in an easy-to-handle figure 8 fold. No tangling, snarling or kinking. When the band is torn, the natural resilience of the wires makes it easy to straighten them out in the desired manner.

DON'T RUN THE *RISK* OF PREMATURES. REMEMBER—THE

DUPONT REG. U.S. PAT. OFF. **EXPLOSIVES** *and*

DETONATORS

Another improvement in Du Pont Electric Blasting Caps

New Aluminum Foil

SHIELDED SHUNT

Gives double protection

DU PONT now offers *double protection* against stray currents on all electric firing devices—electric blasting caps, delays, delay igniters, squibs and delay squibs.

The new Aluminum Foil Shielded Shunt affords a short circuit of the leg wires and also shields the short-circuited leg wires from contact with possible stray currents.

Electrical tests have proved that this Aluminum Foil Shielded Shunt gives greater protection to the blaster than any short circuit heretofore offered to the user.

The Aluminum Foil Shielded Shunt can also be used with far less delay—no lost time in untwisting or straightening of leg wires before connecting up.

* * *

The new Aluminum Foil Shielded Shunt is "standard equipment" on all Du Pont electric firing devices for underground use. You may also have it at no extra cost on electric detonators for use above ground by specifying Aluminum Foil Shielded Shunt.

E. I. DU PONT DE NEMOURS & CO., INC.

Explosives Department **Wilmington, Delaware**

MOST DEPENDABLE DETONATOR IS THE SAFEST DETONATOR

BLASTING ACCESSORIES

portation Corporation of North Carolina. It was chartered in 1937, with W. H. Cralle, of Fort Myers, Fla., president; David A. Olsen, New York, vice-president, and Frank J. Gardner, of New York, treasurer. Engineers for the corporation are Stuart, James & Cooke, New York.

Coal Commission to Oppose Natural-Gas Petition

A petition by the National Bituminous Coal Commission asking permission to intervene and participate in the proceeding before the Federal Power Commission on the application of the North Dakota Consumers' Gas Co. for a certificate of public convenience and necessity for, or an order disclaiming jurisdiction over, the construction, operation and maintenance of proposed natural-gas pipe lines in North Dakota and Minnesota was filed on Jan. 13. The petition also urges that no hearing be assigned for at least 30 days in order that the Coal Commission may have time to make adequate preparation.

The gas company proposes to build, at an estimated cost of $4,254,300, a system of pipe lines from Mandan to Fargo and from Fargo to Grand Forks, N. D.; and from a point near Grand Forks to Crookston, Minn. It seeks to acquire, operate and maintain distribution systems for the sale of gas in 32 municipalities and also sell it at wholesale to companies in seven other municipalities.

The Coal Commission declares in its petition that an abundance of coal now exists to meet any present or future fuel needs in the territory the proposed gas lines would serve and that ample facilities are available to transport the coal there. Furthermore, it states, displacement of coal by natural gas in the areas involved would have an adverse effect on the public interest in that it would be a serious blow to the long-established agencies which transport coal to and market it there, and would divert coal to other markets already congested, in which event coal production would be curtailed or would cease in the affected producing areas. Substitution of natural gas for coal in the areas affected, it was said, also would further complicate the nation's unemployment problem.

Hillman to Run Rainey Mines

The Hillman Coal & Coke Co., Pittsburgh, Pa., announced on Jan. 14 that it would take over the supervision of operations for W. J. Rainey, Inc., Uniontown, Pa., which has five mines in Fayette, Greene and Washington counties, Pennsylvania. No changes in mine personnel are contemplated.

Hard-Coal Stoker Gains

Commenting on the 43.3 per cent increase in sales of mechanical anthracite stokers in the first eleven months of 1938 as compared with the corresponding period of the preceding year. A. F. H. Scott, assistant to the president of Anthracite Industries, Inc., observed: "The fact that sales of automatic anthracite

Sales of Mechanical Stokers Recede Sharply

Sales of mechanical stokers in the United States during November last totaled 7,917 units, according to statistics furnished the U. S. Bureau of the Census by 112 manufacturers (Class 1, 65; Class 2, 42; Class 3, 43; Class 4, 34; Class 5, 10). This compares with sales of 17,681 units in the preceding month and 6,500 in November, 1937. Sales by classes in November last were: residential (under 61 lb. of coal per hour), 6,643 (bituminous, 5,668; anthracite, 975); small apartment-house and small commercial heating jobs (61 to 100 lb. per hour), 608; apartment-house and general small commercial heating jobs (101 to 300 lb. per hour), 438; large commercial and small high-pressure steam plants (301 to 1,200 lb. per hour), 194; high-pressure industrial steam plants (more than 1,200 lb. per hour), 34.

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stokers continued to show sizable increases over practically the entire year while general business indices had been declining sharply is more than encouraging. It proves that promotion of automatic heating with a clean, economical fuel will benefit not only the equipment manufacturers, who are devoting more time and effort to automatic stoker sales, but to wholesale and retail dealers all along the line."

A.I.M.E. Convention Program Covers Diverse Interests

With arrangements for the annual meeting of the American Institute of Mining and Metallurgical Engineers nearing completion, last year's record turn-out of more than 2,300 persons is expected to be exceeded. The meeting, which will be held Feb. 13-16 at the Engineering Societies Building, New York City, will feature the following papers at the Coal Division sessions:

"A Rational Method of Graphing Coal Washability Data," H. J. Rose, Mellon Institute; "The Treatment of Coal With Oil and Other Petroleum Products," J. M. Pilcher and Ralph A. Sherman, Battelle Memorial Institute; "A Study of the Equilibrium Method of Determining Moisture in Coal for Rank Classification," H. F. Reed and O. W. Rees, Illinois Geological Survey; "Coal Around the World," John C. Cosgrove.

"The Technical, Economic and Social Aspects of Bootlegging or the Stolen-Coal Problem in the Southern Anthracite Field," George H. Jones, general superintendent, Stevenson Coal Co.; "Complete Automatic Heat With Anthracite," H. J. Rose and E. T. Selig, Jr., Mellon Institute; "Coal Processing," M. D. Curran, Radiant Fuel Corporation.

"Flocculation and Clarification of Coal Slurries," George R. Gardner and Kenneth B. Ray; "Résumé of Present Position and Research Work in the Coal Industry," E. S. Grumell, Imperial Chemical Industries; "Development of Flowsheet and Choice of Equipment for Isabella Preparation Plant of Weirton Coal Co.," Charles W. Lotz.

"Origin of Coal," E. Berl, Carnegie Institute of Technology; "Development of a Fuel-Gas Producer Using Electrical Energy as a Source of Heat," Harry A. Curtis, Ralph Stitzer and Wilbur J. Darby; "Statistical Analysis of Size, With Particular Reference to Coal," Paul S. Roller, U. S. Bureau of Mines.

"Practice in the Use of Collapsible Steel Props With Longwall Mining in the Northern Anthracite Field," John Buch, Pennsylvania State College; "An Investigation of the Supervisory Problems of Face Preparation and Loading," James Hyslop, Walter Bledsoe & Co.; "Economics of Wood Preservation in Underground Mining," Reamy Joyce; "Organized Efforts in Accident Prevention," Harry A. Leidlich; "Technical Considerations in the Design of Cutter Bars, Chains and Bits to Meet Mining Conditions," Charles L. Bowman, Bowdil Co., and John Buch; "Mechanical Loading," J. H. Fletcher, Allen & Garcia Co.; "Coal-Mine Mechanization—A Case Study," J. W. Woomer and Jerome C. White, Hanna Coal Co. of Ohio; "Phenomena in the Ignition of Firedamp by Explosives: Particles From the Detonation," S. L. Gerhard and Wilbert J. Huff, U. S. Bureau of Mines.

Conservation to Be Taught By Radio Drama

A series of radio programs on conservation, entitled "What Price America?" will be presented beginning Jan. 28 by the U. S. Department of the Interior. The series, comprising 26 broadcasts, will be given on Saturdays starting at 5 p.m. (E.S.T.) over stations of the Columbia Broadcasting System. The department's aim is to further the education of the American public in appreciating the necessity for wise and proper use of natural resources.

The program will give in dramatized form the history of conservation in terms of the discovery, exploitation and wise use of America's resources. The story will begin with the settlers of 1620 and will be a "chronicle of thrilling but profligate growth to 1939."

Industrial Notes

Joseph Becker, vice-president and a director of Koppers Co., also has been made president of KOPPERS-RHEOLAVEUR Co., designer and builder of coal-washing plants. W. S. McAleer, manager of Koppers-Rheolaveur, has been made a vice-president and director of the company. Mr. Becker also is general manager of Koppers engineering and construction division. Associated with the company since its beginning, he has been an official since 1920. He is the inventor of the Koppers Becker type coke oven and of processes for the recovery of derivatives in the manufacture of gas and coke. Mr. McAleer joined the former Koppers Construction Co. (now the engineering and construction division of Koppers Co.) as an engineer in 1926.

ALLIS-CHALMERS MFG. Co. has established a new branch office at 1060 Broad

St., Newark, N. J., in charge of C. A. Pihl, branch manager.

GENERAL ELECTRIC Co. has appointed R. M. Alvord, J. E. N. Hume and A. S. Moody as commercial vice-presidents. Mr. Alvord has been manager of the company's Pacific district; Mr. Hume has been manager of the industrial department, and Mr. Moody has been manager of the Northwest district.

INDEPENDENT PNEUMATIC TOOL Co., Chicago, has elected Neil C. Hurley, Jr., a vice-president, after four years as secretary of the company. He joined the company in 1932 and has been active in the direction of sales for the electric tool division.

FALK CORPORATION has promoted Louis W. Falk to executive engineer and W. P. Schmitter to chief engineer. Harold S. Falk, vice-president, continues as director of engineering.

UNITED STATES RUBBER Co., wire department, has appointed M. P. Lewis, former Eastern district manager, wire sales, as assistant manager, wire sales department, with headquarters at the company's main office, in New York City. H. H. Weber, assistant manager, wire sales department, since 1934, has been made commercial engineer of that department. Succeeding Mr. Lewis as manager, wire sales, for the Eastern district will be H. J. MacDonald. Named to the post formerly held by Mr. MacDonald is C. W. Short, for the last two years development manager at the Bristol plant. The Baltimore (Md.) mechanical goods division branch, which has heretofore functioned under supervision of the Philadelphia (Pa.) branch, will henceforth operate as an independent branch, under R. F. Jackson, as manager of mechanical sales. Frank M. Urban, formerly assistant to W. T. Keenan, manager of mechanical sales, Chicago branch, has been appointed assistant manager of mechanical sales there.

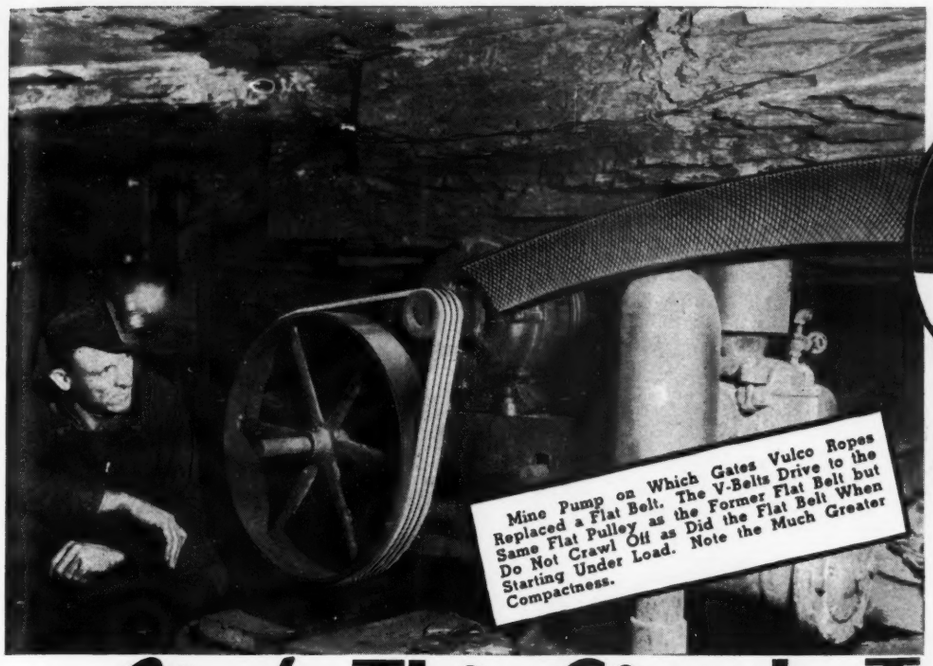
GREEN FUEL ECONOMIZER Co., INC., Beacon, N. Y., has elected John M. Birkenstock as vice-president and general manager. A graduate of Stevens Institute of Technology, he has been sales engineer for the company since 1924. He was previously connected with the Babcock & Wilcox Co. Clinton S. Messler, vice-president and chief engineer, has taken charge of production. He has been chief engineer since 1917.

Battelle to Test Stokers For Space Needs

A field survey of more than one hundred bituminous-fired stoker installations in all sizes and types of boilers is to be started immediately by fuel engineers of Battelle Memorial Institute, Columbus, Ohio, in four cities: Chicago, Cincinnati, Ohio; St. Louis, Mo., and Columbus, Ohio. Under the direction of Ralph A. Sherman, chief fuel engineer in charge, the tests will be made under different conditions and while the installations are in operation to establish in an authoritative and unbiased manner the data upon which combustion space requirements for stoker-fired bituminous coal can be determined.

This move is the result of a recent meeting of representatives of the Stoker Manufacturers' Association with others from the Steel Heating Boiler Institute, Institute of Boiler and Radiator Manufacturers, National Coal Association and National Smoke Prevention Association. These organizations named a steering committee which will supervise the work of the engineers making the survey. It is expected that the data will be ready for publication at the annual meeting of the Smoke Prevention Association in Milwaukee, Wis., next June.

The steering committee includes: C. E. Bronson, chief engineer, Kewanee Boiler Corporation, representing the Steel Heating Boiler Institute; John P. Magos, directing engineer, research laboratories, Crane Co., representing the Institute of Boiler and Radiator Manufacturers; C. A. Reed, director, engineering department, National Coal Association; William M. Culbert, chief smoke inspector, city of Nashville, Tenn., and president of the Smoke Prevention Association, and Frank Chambers, chief smoke inspector, city of Chicago, and secretary of the Smoke Prevention Association, both representing the Smoke Inspectors of America; E. C. Webb, engineering service manager, Iron Fireman Mfg. Co., and B. M. Guthrie, chief engineer, stoker division, Fairbanks, Morse & Co., both representing the Stoker Manufacturers' Association. In addition to the foregoing representatives of the various participating organizations Mr.



Mine Pump on Which Gates Vulco Ropes Replaced a Flat Belt. The V-Belts Drive to the Same Flat Pulley as the Former Flat Belt but Do Not Crawl Off as Did the Flat Belt When Starting Under Load. Note the Much Greater Compactness.

THE **Concave** Side
IS A GATES PATENT

Make This Simple Test and *Cut* YOUR transmission Costs!

PICK up *any* V-belt having the ordinary straight side and *bend* the belt. Three things will happen, right before your eyes.

(1) The top of the belt is under tension and grows *narrower.* (2) The bottom is under compression and becomes *wider.* (3) The sides of the belt *bulge out.* (Figure 1, at left.)

This bulging of the straight sided V-belt in its sheave-groove costs you money in *two* ways—(1) The bulge causes uneven sidewall wear—*shorter life!* (2) The bulging side cannot evenly grip the sheavewall—a *loss in transmission* efficiency!

In figure 2, you see how the precisely engineered *concave* side of the Gates Vulco Rope exactly corrects this bulging. Two distinct *savings* result. (1) The Gates Vulco Rope wears evenly—*longer life!* (2) The entire side-wall grips the pulley—carries heavier loads without slippage: saves the belts and also saves your *power!*

The Gates Vulco Rope is the *only* V-belt built with the patented concave side.

THE GATES RUBBER COMPANY

Engineering Offices and Stocks in All Large Industrial Centers

GATES VULCO ROPE DRIVES

CHICAGO, ILL., 1524 South Western Ave. HOBOKEN, N. J., Terminal Building BIRMINGHAM, ALA., 1631 1st Ave., S. LOS ANGELES, CAL., 741 Warehouse St.
DENVER, COLO., 999 South Broadway DALLAS, TEX., 2213 Griffin Street PORTLAND, ORE., 1231 N. W. Hoyt St. SAN FRANCISCO, CAL., 2700 16th St.

Permissible Plates Issued

Three approvals of permissible equipment were issued by the U. S. Bureau of Mines in December, as follows:

Goodman Mfg. Co.: Type 512-CL3 shortwall mining machine; 50-hp. motor, 500 volts, a.c.; Approval 357-A; Dec. 3.

National Carbon Co., Inc.: Eveready No. 702 single-shot dry-cell blasting unit; Approval No. 1216; Dec. 2.

National Carbon Co., Inc.: Eveready No. 704 single-shot dry-cell blasting unit; Approval No. 1217; Dec. 2.

Sherman is a member of the steering body, and Marc G. Bluth, executive secretary, Committee of Ten, and secretary of the Stoker Manufacturers' Association, is secretary of the committee.

Illinois to Plant 700,000 Trees On Old Stripping Land

As part of an extensive program for 1939 the State Division of Forestry of Illinois expects to plant 700,000 trees on worked-out strip-mine areas. The division planted 300,000 trees during 1938 on such tracts. According to Thomas J. Lynch, director of the State Department of Conservation, the cost of this work is paid by the strip-mine operator, with the division providing trees and supervision at nominal cost.

To Move Tipple to New Mine

The National Fuel Co. is preparing to open a new coal mine about 1½ miles from its Puritan mine, 26 miles north of Denver, Colo., actual work being scheduled to start soon. The Puritan mine, started in 1908, is practically worked out and will be abandoned. The tipple, however, will be moved to the new operation, it having been reconstructed, following a fire in 1934, with that purpose in mind (*Coal Age*, January, 1935, p. 16).

Virginia Rate Boost Denied

Authority to increase intrastate freight rates on bituminous coal in Virginia, sought by eleven railroads and disputed at four hearings before the State Corporation Commission during the last summer and autumn, has been denied by the Commission. Refusal to grant the petition of the carriers, according to the terse order of the Commission, was because the evidence presented "does not justify an increase."

Representatives of the roads contended that the carriers were suffering drastic revenue losses and that a rate boost was needed badly. They maintained that the 10c. per ton increase sought was in line with recent advances in interstate rates on bituminous coal allowed by the Interstate Commerce Commission. The Virginia Coal Operators' Association and

other opponents of the proposed increase protested, however, that higher rates would work a great hardship on coal mines and associated industries in the State. Counsel for several manufacturing concerns, including the Mathieson Alkali Works, said that their operations would be curtailed considerably if the rate raise was allowed.

Republic Develops Stripping

The Republic Steel Corporation has developed a stripping operation at Travilla, Ala., on the Louisville & Nashville R. R. near Tuscaloosa. Coal is being moved from the new operation to the corporation's Gadsden operations at the rate of about 25 carloads per week.

Push Hard-Coal Promotion

Plans for continuation of anthracite advertising throughout this winter and spring have been completed, according to James P. Duffy, assistant to the president of Anthracite Industries, Inc. "The campaign theme adopted last fall," said Mr. Duffy, "featuring anthracite as the only seven-star fuel, will be followed." Modern hard-coal equipment also will be featured.

Gas Burners Lag in Chicago

Out of 65 permits issued by the Chicago Department of Smoke Inspection and Regulation in December last for heating installations 53 were for underfeed stoker installations; 7 for oil-burners; 4 hand-fired coal installations under fuel agreements; and 1 spreader stoker. There was not a single permit issued for a gas-burner installation. The figures do not cover small stoker installations for residences and two-flat dwellings, for which permits are not required.

To Increase Warrior Service

The Inland Waterways Corporation is to expend about two million dollars for additional barges and other equipment during the present year, according to a statement at Birmingham, Ala., by Major General T. Q. Ashburn, head of the company. The corporation operates the Mississippi-Warrior service, which provides water transportation for a number of coal mines in the Walker County (Ala.) field and moves a large tonnage to Gulf ports.

Trade Literature

AIR COMPRESSORS—Sullivan Machinery Co., Michigan City, Ind. Bulletin A-22 (20 pp.) describes and illustrates Unitair stationary and semi-portable types featuring forced-feed lubrication and the design of a simplified automatic stop and start control for motor-driven styles. The Unitair type is available for displacements ranging from 107 to 435 cu.ft. per

minute and for commercial pressures up to 125 lb. per square inch.

APRON CONVEYORS—Chain Belt Co., Milwaukee, Wis. Bulletin 332 (6 pp.) illustrates the use and design of Rex units, giving detailed engineering information necessary to the use of these conveyors.

BEARING LUBRICATION—Texas Co., New York City. Forty-page booklet traces the development of cooperative effort by the petroleum industry in furthering friction and power economy through scientific lubrication of ball and roller bearings. Numerous illustrations—both halftone and line—as well as a schedule of lubricants recommended for various sized bearings under diverse temperature conditions add to the interest of the brochure.

CABLE SPLICERS—American Mine Door Co., Canton, Ohio. Eight-page bulletin shows the importance, in promoting mine efficiency, of modern time-saving splicers, cable splices, vulcanizing splicers, terminal binders, welding bond terminals, compression bond terminals, steel-rope binders and splicer tools.

CONTINUOUS BLOWDOWN SYSTEMS—Elgin Softener Corporation, Elgin, Ill. Bulletin 510 (8 pp.) is a treatise on these units for steam boiler plants, illustrating the need for them with useful charts and tables. The latter also point out savings to be realized with heat exchangers.

EXCAVATORS—American Hoist & Derrick Co., St. Paul, Minn. Bulletin 700-G-11 (8 pp.) recounts the features of American Gopher 1½-, 1¾- and 2-yd, heavy-duty convertible machines for use either as shovels, draglines or clamshell cranes.

FUSE—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Bulletin F. 8450 (8 pp.) describes dry boric-acid power fuses for the protection of high-voltage circuits and equipment, applicable in utility and industrial power plants, and for all high-voltage power use, indoor and outdoor. Operating and money-saving advantages, as well as capacities, are given.

HOISTS—American Hoist & Derrick Co., St. Paul, Minn. Bulletin 100-H-1 (24 pp.) cites the salient features of the 20-50-hp. general-purpose hoist, with specifications and illustrations. Catalog 100-H-2 (16 pp.) lists various types of gasoline, diesel and electric hoists, giving sizes and ratings.

MANGANESE ALLOYS—American Manganese Steel Division of the American Brake Shoe & Foundry Co., Chicago. Booklet (24 pp.) presents the research facilities that made Amsco alloy possible, the properties of this alloy and its wide range of usefulness.

METHANE TESTER—Mine Safety Appliances Co., Pittsburgh, Pa. Bulletin No. DN-3 (2 pp.) details the new M.S.A. methane tester, a pocket-size, easily operated device for use on the job by any workman. The instrument is said to give positive, immediate indication of the methane content of air in concentrations much lower than can be determined by a flame safety lamp, with accuracy comparable to that obtained by analyzing bottle samples with an Orsat gas-analyzing apparatus.

POWER TRANSMISSION AND MATERIALS HANDLING—Palmer-Bee Co., Detroit, Mich. Forty-eight page book illustrates the company's manufacturing facilities and many of its products and installations. The installation views show a wide range of methods suggesting solutions to like problems in other industries.

PROPORTIONING FEEDER—Merrick Scale Mfg. Co., Passaic, N. J. Bulletin 388 (12 pp.) illustrates and describes the Feedoweight, designed for use in feeding and proportioning materials into process at predetermined but variable rate. In addition to feeding material uniformly by weight an automatic totalizer may be furnished to totalize the weight of all material so fed.

PULVERIZED-COAL SYSTEMS—Combustion Engineering Co., Inc., New York City. Catalog No. PC-5 (36 pp.) contains a synopsis of the development of pulverized-coal firing and its influence on the capacities and designs of steam-generating units. The section on mills describes both the impact and bowl-mill types for direct firing; that on burners deals with tangential corner firing, vertical firing and horizontal turbulent burners. Mill feeders also are described and space is given to a discussion of furnaces for burning pulverized coal.

ROCK-DUST DISTRIBUTORS — American Mine Door Co., Canton, Ohio. Bulletin Form No. 106 (16 pp.) describes and pictures three types of "Dustributors," giving specifications and emphasizing safety features.

ROCK DRILLS—Texas Co., New York City. This 36-page booklet, entitled "Rock Drills—How to Keep Them Functioning Properly," emphasizes the importance of lubrication in promoting low maintenance costs and maximum footage in operation. Appended is a list of Texaco lubricants for rock-drill service in various conditions.

STEEL PRODUCTS—Joseph T. Ryerson & Son, Inc., Chicago. Condensed stock list and data book (48 pp.) contains an explanation of the change in steel classifications and extras, general data tables of interest to steel users, a condensed summary of products available for immediate shipment from stocks, and an illustrated article on the story behind Ryerson steel service.

STRIPPING WITH SCRAPERS—R. G. LeTourneau, Inc., Peoria, Ill. Eight-page booklet gives examples of tractor tool flexibility in stripping, quarrying and aggregates production problems with actual job stories in picture-caption style.

TIRES—B. F. Goodrich Co., Akron, Ohio. Handbook (66 pp.) on truck, bus and farm and industrial tractor tires contains statistical material for all operators of commercial vehicles. Included are description and specifications of the company's products for these varied services, together with load analysis, load and service diagrams, load ratios and inflation pressures.

TRACTORS—Caterpillar Tractor Co., Peoria, Ill. The economies, advantages and capacities of the diesel D4 unit are set forth in a 32-page booklet, with cutaway halftones showing the principles of the diesel engine, its fuel system, operation, etc. Separate chapters are devoted to

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300% in Adhesiveness 26% in Tensile Strength
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the transmission, final drive and tracks. Booklet Form 4876 (32 pp.) tells the capacities, specifications and mechanical features of the largest Caterpillar diesel tractor, with action views.

TRANSMISSION — Ideal Commutator Dresser Co., Sycamore, Ill. Folder S-O-S 836 (6 pp.) cites many features and a wide variety of uses of the "Selecto-O-Speed" variable speed transmission.

VACUUM CLEANERS—United States Hoffman Machinery Corporation, New York City. Booklet A-303 (8 pp.) cites the advantages of the company's portable units, four sizes being available to meet widely varying needs.

VIBRATING SCREENS — Allis-Chalmers Mfg. Co., Milwaukee, Wis. Bulletin 1474-B (8 pp.) reveals the salient features of the Aero-Vibe inclined-type unit for light and medium duty screening where cost and maintenance must be kept low.

WATER SOFTENERS—International Filter Co., Chicago. Bulletin 1850 (16 pp.) describes Infilco hot-flow water softeners for boiler-feed water treatment; illustrations show equipment, details and methods.

WELDING EQUIPMENT—Lincoln Electric Co., Cleveland, Ohio. Bulletin 401 (36 pp.) gives procedures for producing all types of welds in mild steel, for welding all metals used to any extent industrially and for applying surfacing metal to meet any type of wear-action in service. Bulletin 412-A (20 pp.) explains arc-welding technique with the new Lincoln "Shield-Arc" welder with self-indicating dual continuous control.

WIRE ROPE—With an impressive 16-page announcement, profusely illustrated, the Jones & Laughlin Steel Corporation makes known that its new Gilmore Wire Rope Division, at Muncy, Pa., has been completed and is in full operation. With the very latest scientific machinery, it announces that it will produce precision ropes from 1/16 to 4½ in. in diameter with a tolerance as close as 1/1000 in.

WIRE-ROPE SLINGS—Macwhyte Co., Kenosha, Wis. Booklet (16 pp.) entitled "Safe Handling" pictures and describes various braided wire-rope slings for handling loads of almost any shape, size or weight.

Coal-Mine Fatality Rate Shows Further Decline

Accidents at coal mines of the United States caused the deaths of 63 bituminous and 17 anthracite miners in November last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors. With a production of 35,480,000 tons, the death rate among bituminous miners was 1.78 per million tons, compared with 3.21 in the corresponding month of the preceding year.

The anthracite fatality rate in November last was 4.55, based on an output of 3,737,000 tons, as against 3.38 in November of the year before.

For the two industries combined, the death rate in November last was 2.04, compared with 3.23 in November, 1937.

Fatalities during November last, by causes and States, as well as comparable rates for the first eleven months of 1937 and 1938, are shown below:

UNITED STATES COAL-MINE FATALITIES IN NOVEMBER, 1938, BY CAUSES AND STATES

State	Underground: Falls of roof	Falls of face	Haulage	Explosives	Electricity	Mine fires	Other causes	Total underground	Open-cut and Surface: Mine cars	Railway cars	Machinery	Other causes	Total surface	Grand total
Alabama	1	...	1	...	...	...	...	2	...	...	...	...	...	2
Arkansas	1	...	...	...	...	...	...	1	...	...	...	...	...	1
Colorado	1	...	...	...	1	...	...	2	...	...	1	...	1	3
Illinois	4	...	2	...	...	...	...	6	...	...	...	...	...	6
Iowa	1	...	...	...	...	...	...	1	...	...	...	...	...	1
Kentucky	5	...	...	1	2	...	...	8	...	...	...	...	...	8
Montana	...	...	1	...	...	...	...	1	...	...	...	...	...	1
New Mexico	1	...	...	...	...	...	1	2	...	...	...	...	...	2
Ohio	3	...	...	...	...	2	...	5	...	...	1	...	1	6
Oklahoma	...	...	...	...	...	...	...	...	...	...	...	1	1	1
Pennsylvania (bit.)	7	...	...	...	...	...	...	7	...	...	1	...	1	8
Tennessee	1	...	...	...	...	...	...	1	...	...	...	...	...	1
Virginia	4	...	...	...	...	...	...	4	...	...	...	1	1	5
West Virginia	6	...	6	2	1	...	...	15	1	1	1	...	3	18
Total (bituminous)	35	...	10	3	4	2	1	55	1	1	4	2	8	63
Pennsylvania (anthracite)	12	1	2	...	...	...	1	16	...	...	...	1	1	17
Grand total	47	1	12	3	4	2	2	71	1	1	4	3	9	80

FATALITIES AND DEATH RATES AT UNITED STATES COAL MINES, BY CAUSES*

January–November, 1937 and 1938

Cause	Bituminous: Number Killed 1937	1938	Killed per Million Tons 1937	1938	Anthracite: Number Killed 1937	1938	Killed per Million Tons 1937	1938	Total: Number Killed 1937	1938	Killed per Million Tons 1937	1938
Falls of roof and coal	575	396	1.421	1.294	108	116	2.319	2.858	683	512	1.512	1.477
Haulage	216	122	.534	.399	26	21	.558	.517	242	143	.536	.413
Gas or dust explosions:												
Local	21	18	.052	.059	...	2	.....	.049	21	20	.046	.058
Major	95	60	.235	.196	...	18	.....	.444	95	78	.211	.225
Explosives	38	23	.094	.075	14	11	.301	.271	52	34	.115	.098
Electricity	47	37	.116	.121	5	2	.107	.049	52	39	.115	.112
Machinery	30	17	.074	.055	2	...	.043	.....	32	17	.071	.049
Shaft	14	6	.035	.019	6	3	.129	.074	20	9	.044	.026
Miscellaneous	33	21	.081	.069	17	13	.365	.320	50	34	.111	.098
Stripping or open-cut	16	8	.040	.026	6	8	.129	.197	22	16	.049	.046
Surface	56	27	.138	.088	17	9	.365	.222	73	36	.162	.104
Total	1,141	735	2.820	2.401	201	203	4.316	5.001	1,342	938	2.974	2.706

*All figures subject to revision.

6
BASIC ADVANTAGES
- Heavier Loads without Spillage
- Reduced Power Consumption
- Reduced Track Maintenance
- Elimination of Rail Bonds
- Increased Rail Life
- Faster Haulage

REDUCE TRACK MAINTENANCE

By eliminating rail joints and rail bonds, Thermit Rail Welding banishes all joint maintenance. It does away with the need for renewing plates, bonds and lock washers, which may be required frequently where corrosion is excessive. At the same time, welded track holds its line and surface better and requires less maintenance generally. It has been estimated, for example, that at the present time, with standard construction, between 45% and 60% of all track maintenance is due to rail joints. Where joints are eliminated, therefore, this percentage of maintenance expense is saved. Modernize your main haulage track with Thermit Welding. Avail yourself of the greater operating economies made possible by Continuous Rail. Send today for details on the permanent economies provided by this most advanced type of mine track. Ask for the pamphlet "Continuous Rail for Main Haulage Track."

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50% SAVINGS IN HAULAGE

WITH

Walter 4-Point Positive Drive!

Walter 4-Point Positive Drive
Suspended Double Reduction

In coal stripping, Walter Tractor Trucks hauling one or two 25-ton trailers are saving as much as 50% in haulage cost.

What is the reason? The answer, of course, is WALTER 4-POINT POSITIVE DRIVE, embodying several constructional features that result in performance definitely superior to ordinary "4-wheel drive".

The Walter Automatic Lock Differential proportions the power among the wheels according to their requirements at any instant.

Unique suspended double reduction drive provides adequate gear capacity, better ground clearance and minimum unsprung weight. Tires are not pounded and destroyed by heavy unsprung axle parts. The tires follow the ground and retain their traction, running cooler and lasting longer.

An extra powerful motor delivers rated horse power at moderate engine speeds. Fourteen to one range transmission with six forward speeds provide a fast high gear and very powerful low gears for emergencies, with proper intermediate ratios for all operating conditions.

And last — but vitally important — Walter has correct weight distribution on front and rear wheels and a short turning radius that makes for ease in handling.

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A wire rope of extraordinary toughness, strength, and uniformity of quality... that assures lowest general average rope operating cost. ★ The highest achievement of Roebling's over 90 years of rope making experience!

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STRONGER—Wire of highest strength consistent with ductility and toughness

TOUGHER—Provides maximum resistance against wear, sudden shocks, vibration

SAFER—Unequalled for uniformity of quality

SAVING—Insures lowest general average operating cost

THE HIGHEST DEVELOPMENT IN ROEBLING WIRE ROPE

They've Lessened the Burden of...

OVERBURDEN REMOVAL

Let's look at the stripping problem from the high cost dirt removal angle for the last time. Perhaps, like Kingston Contracting Company, you've already found that your shovel, tied up a good part of the time in overburden removal, contributes largely to high dirt costs.

In this instance, it took a contractor's knowledge of present-day costs to effect the needed economies. With their LeTourneau Model "BU" Carryall* (rated at 12.5 loose yards, heaped) they handled all initial stripping at the Centralia (Pa.) Collieries . . . allowed three 2-yard shovels to maintain productive work. Dirt costs continue to be slashed by the Carryall's capacity, in one complete cycle of load, haul and dump, to spoil overburden far enough from the pit to eliminate rehandling. Working behind a "Caterpillar" D8, the Carryall moved 80 pay yards of breaker rock an hour from an old spoil bank and dumped it 650 feet away, to uncover a new coal vein. That's 1120 pay yards every 14-hour day! Then the Carryall stripped the new pit within profitable shovel range. No longer are the amazing Carryall savings confined to contractors. More than 30 well-known properties have received equally as many low-cost benefits.

At no extra tractor expense, Kingston Contracting Company alternates its D8 between Carryall; and Angledozer* duty, as the work demands . . . another advantage to all-purpose, dependable cable control, as LeTourneau builds it. Changeover is easily done in but a scant half hour's time. The same trigger-quick cable operation that forced all loads from the Carryall bowl by tailgate force-out method, now delivers lightning-fast Angledozer action, powerful, high thrust for pit clean-up, stock piling and ditch digging. You'll find this action necessary to handle all stripping problems at low cost.

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Angledozers*, Buggies*, Bulldozers, Carryall* Scrapers, Cranes, Drag Scrapers, Power Control Units, Rooters*, Treedozers, Sheep's Foot Rollers. *Name Reg. U. S. Pat. Off.

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For Coal Mining

Regardless of type of coal, height of seam, type of mining, size of coal desired, or method of loading, Hercules can aid many operators with its complete list of permissibles, pellet powder, and black blasting powder. Proper selection of these Hercules explosives will help to reduce blasting costs, speed up production, and obtain better performance.

Lump-producing Permissibles: These permissibles represent a wide range of cartridge strength and count. The lower count Red H permissibles are used where higher cartridge strength is necessary, while the Hercoals will usually be found of value in coal that is more easily broken.

Red H C, L.F. 276*	Hercoal C-1 .....400*
Red H D, L.F. 316*	Hercoal D 450*
Red H F, L.F. 356*	Hercoal F-1 .....500*

Permissibles for Rock Work or Producing Fine Coal: Two Hercules permissibles were especially designed for this type of work; namely, Red H B, L.F. and Collier C, L.F. In tight places, the higher cartridge strength of Red H B, L.F. may be desirable, while in easier shooting it is sometimes more economical to use the higher count Collier C, L.F.

Red H B, L.F. 280*	Collier C, L.F. 320*

*Cartridge counts refer to the approximate number of 1¼-in. × 8-in. cartridges in 100 lb. of explosives.

Gelatin Permissibles for Wet Work or Rock Work: Hercogel A offers the highest water resistance available in permissible explosives. For most water conditions, however, Hercogel 2, a semi-gelatin permissible, should prove satisfactory, and where it can be used it will be found much more economical. In some rock work a gelatin or semi-gelatin permissible is desirable because of high cartridge strength and rate of detonation. Gelatin permissibles are not as economical to use as ammonia permissibles.

Hercogel A 206*	Hercogel 2 .....240*

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Hercules Pellet Powder: Hercules pellet powders consist of black powder compressed into cylindrical pellets 2 in. long and 8-in. cartridges are packed four pellets to the cartridge. They are made in diameters ranging from 1¼ in. to 2 in.

"A"— Dense and fast (212*)
"B"— Dense and slow (212*)
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"E"— Bulky and slow (250*)

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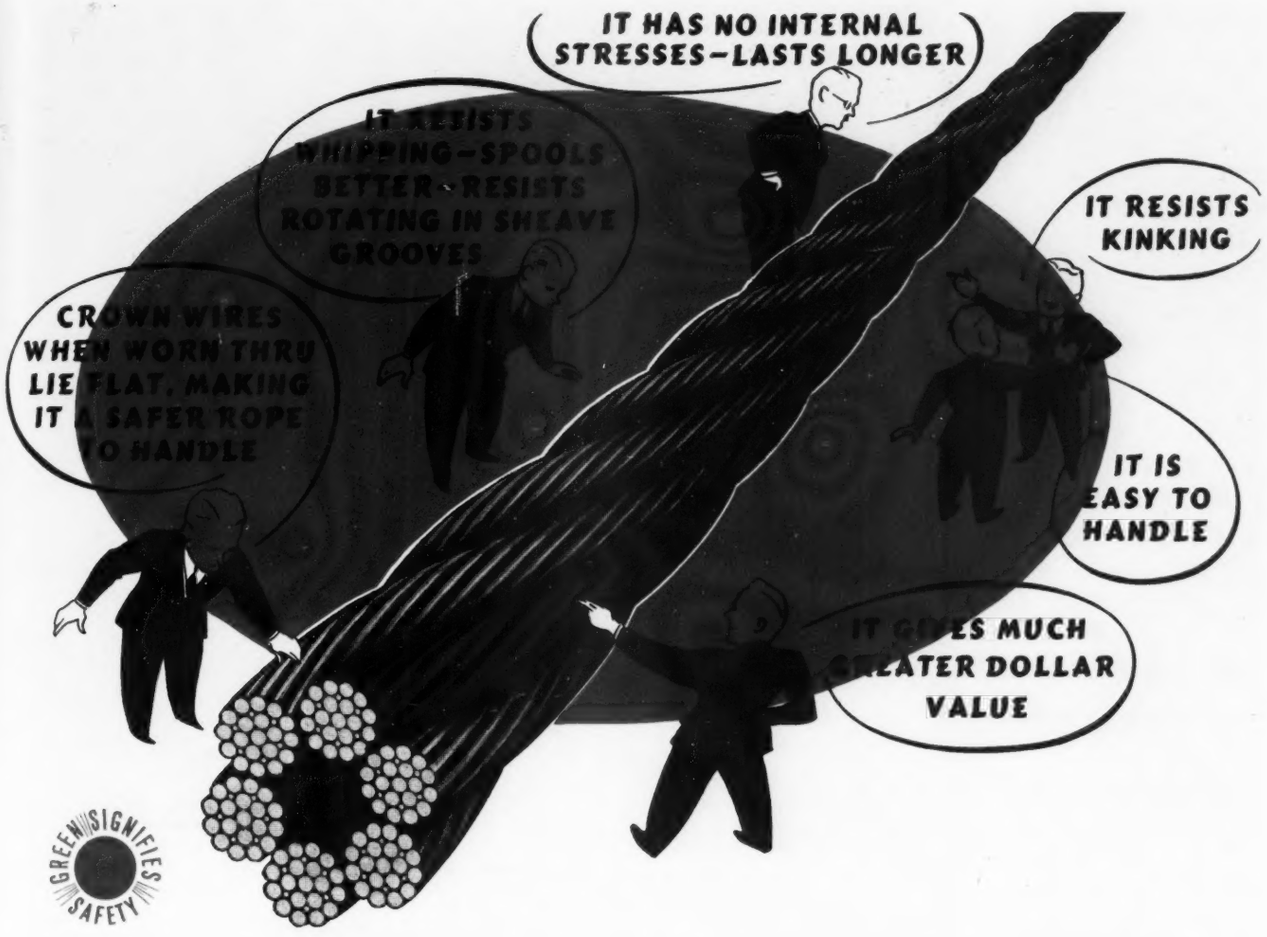

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GULF RESEARCH TECHNICIANS develop improved lubricant . . . help mine managers reduce operating costs!

PICTURED above is a typical scene in the Gulf research laboratories. Gulf technologists, in this instance, are working with an experimental Diesel engine, studying Diesel lubrication problems. Nearby, another exhaustive research goes forward on the lubrication of a modern type of textile spindle. In the next room a railroad car bearing is being run under precisely the speed and load conditions of actual service. And a host of other lubrication problems —many of them born of our rapidly advancing mechanical age—are being studied each day by Gulf's large staff of scientific men.

To what end is this extensive research work carried on? What is its objective? By perfecting better lubricants, and better methods of applying them, Gulf is doing its part to *help industry reduce operating costs*—save money on maintenance and power, improve production and make the machinery for which you paid real money last longer.

These Gulf technologists are examining pistons and rings removed from the experimental Diesel engine shown above, after an extended period of operation. They find that ring sticking, cylinder wear, ring wear, gum formation and objectionable deposits have been minimized by the proper use of the right grades of Gulf's higher quality Diesel lubricants.

Your machinery, old or new, will be better prepared to give you the efficient production you need when you protect it with Gulf's higher quality oils and greases. Available to you, through more than 1100 warehouses in 28 states, is Gulf's complete line of 400 quality oils and greases . . . and the services of an experienced Gulf lubrication engineer. Ask him to recommend proper lubrication for your equipment. GULF OIL CORPORATION, GULF REFINING COMPANY, PITTSBURGH, PA.

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That's been proved . . . by the International Conveyor Belt that handled 7,873,967 tons of run-of-mine coal at a belt cost of $.00022 per ton . . . by the Super-Master Conveyor Belt that handled 5,682,149 tons of gold ore in less than five years*. . . and by hundreds of other Manhattan-made Belts handling all kinds of loads on short or long hauls and high or low lifts.

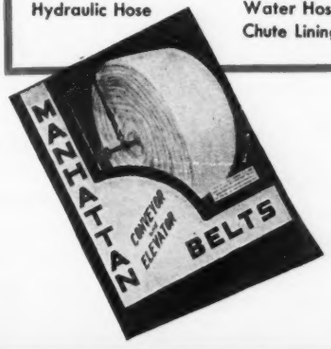
You, too, can have this high tonnage, low cost performance with a Manhattan Conveyor Belt. Let Manhattan's engineers help you select "the right belt for your job" to give trouble-free service throughout its long life.

*A section of this belt after running is now used as a sorting belt and is still in good condition after 18 months' service.

Manhattan Conveyor Belt, 48-inch, 8-ply with 3/16" x 1/16" covers, on slope conveyor in recently mechanized mine. Belt is 1830 feet long.

Condor PRODUCTS

Conveyor and Elevator Belt	Oil and Gasoline Hose	Launder Lining
Transmission Belt	Sand Blast Hose	Industrial Brake Blocks and Lining
V-Belt	Steam Hose	Molded Rubber Goods
Air Hose	Suction Hose	Rubber Lined Tanks
Contractors Hose	Water Hose	Rubber Covered Rolls
Fire Hose	Chute Lining	Abrasive Wheels
Hydraulic Hose		



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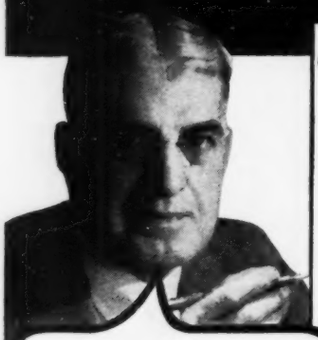
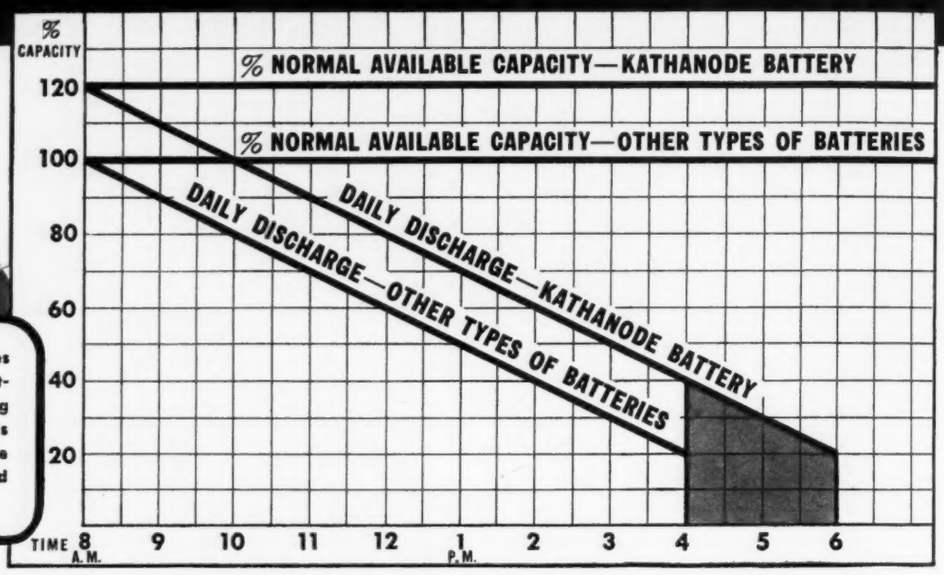
[illegible]

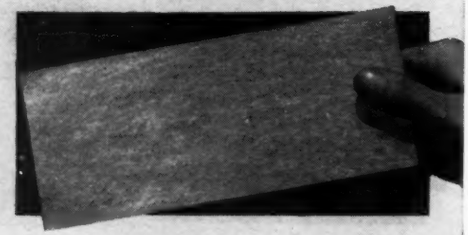
20% EXTRA POWER ALL DAY LONG!



Here are the daily discharge rates of Kathanode and ordinary batteries of the same size, operating under the same load conditions at 80% available capacity! Note Kathanode's reserve at the end of a normal working day.



SPUN-GLASS MAT is secret of Kathanode's high sustained capacity



Years of research and development resulted in the famous Gould flexible, and porous spun-glass mat. Made of many layers of finely-woven glass fibers, placed on each side of every positive plate, it grips the active material, securely locks it in place, and yet allows the electrolyte complete, instant access to the plate. Result: a battery with an extremely high sustained capacity . . . and an exceptionally long life!

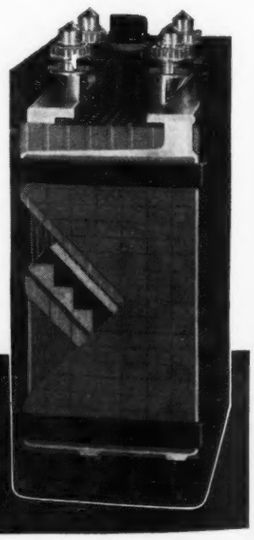
Here's why Gould Kathanode Batteries give you PLENTY OF POWER TO SPARE!

1. *None of the usual losses of active material* — thanks to Gould Kathanode's *exclusive,* patented Spun-Glass mat.

2. *Greater pay-load capacity for the same over-all size.* Because Spun Glass mats prevent plate shedding, Kathanode sediment wells are reduced to *less than half the size* found in ordinary batteries. As more space is available, Gould Kathanode cells hold a *greater amount* of voltage-sustaining electrolyte in immediate contact with a *greater amount* of active, power-producing material.

3. *No more internal electrical losses through treeing and short-circuiting,* thanks to Kathanode's Durapor separator—an exclusive rubber composition unaffected by acid, destructive gases, or oxidation!

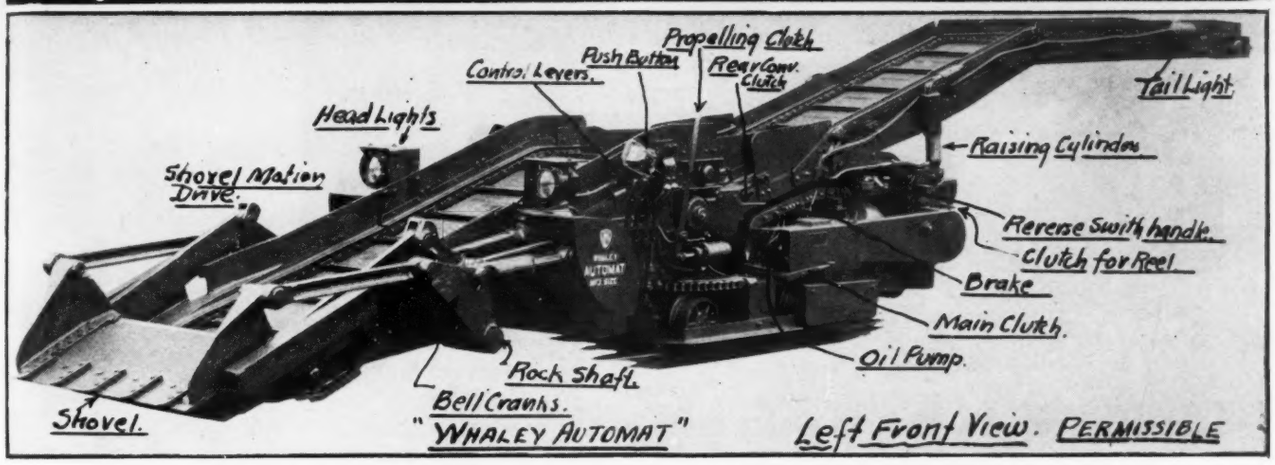
Plan *now* to take advantage of Kathanode's extra day-long power and end-of-day reserve! It will pay you well. There's a size to fit your needs — from 136 to 1,000 ampere-hours capacity. Write us for *free* illustrated details. Gould Storage Battery Corp., Depew, N. Y.



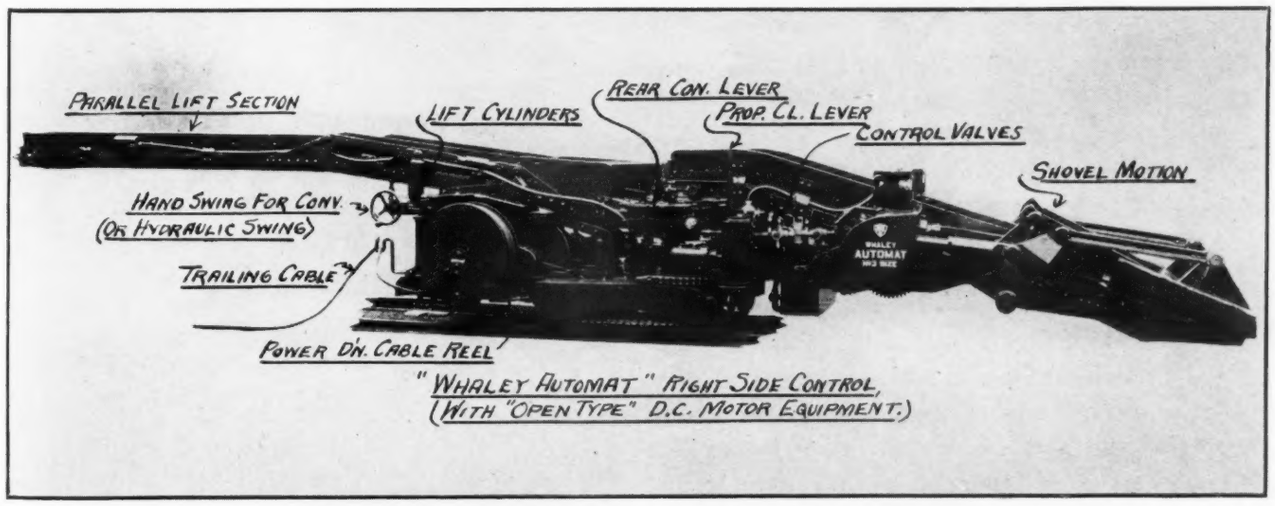
GOULD BATTERIES FOR LOW COST HAULING

"WHALEY AUTOMAT"

...for REDUCED Coal loading COSTS



The "AUTOMAT" for thick seams—high cars



The "AUTOMAT"—for lower seams

THE "AUTOMAT" is the "LOW COST PRODUCER"

because: THE AUTOMATIC SHOVEL is the most efficient leading machine that has ever been devised. It loads more coal, more economically, with less effort, and with perfect cleanup.

LOADING CAPACITY—7 Tons per minute. Max.
3 Tons per minute. Av.

DIGGING ABILITY—Great digging ability, due to the effective application of power by the Shovel Motion, without "Second Mining" or Degradation of the coal.

PARALLEL LIFT REAR CONVEYOR makes perfect discharge to the cars, and loads the cars to full capacity.

EASE OF OPERATION AND SAFETY OF MEN EMPLOYED.

POWER REQUIRED—One 25 H.P. Motor, consuming 1/5 KW hour per ton loaded.

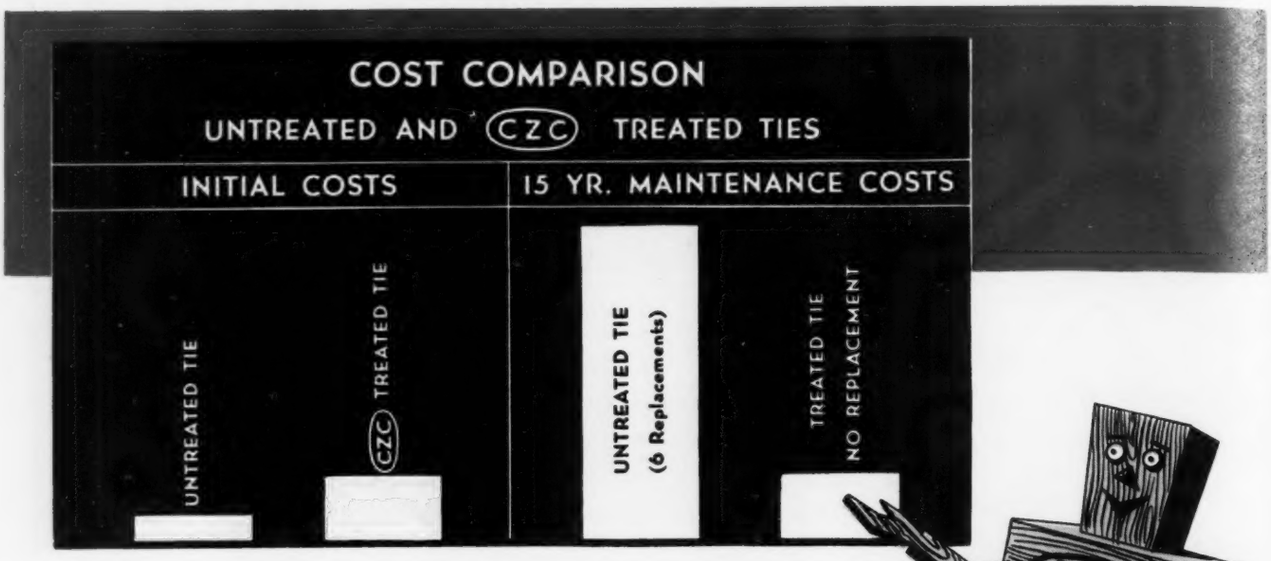
LOW MAINTENANCE—Due to simplicity of construction, accessibility of parts, and efficient use of power.

CONTINUITY OF OPERATION—Minimum mechanical delays.

No Mine can afford to use ordinary Loading Machines when the AUTOMAT is available. Ask for the "WHALEY AUTOMAT" catalog and Motion Booklet—also tell us about your loading conditions. We'll submit interesting data regarding "WHALEY AUTOMAT" performance.

MYERS-WHALEY CO., Inc.

KNOXVILLE (Since 1908) TENN.



Here's proof that DU PONT *Chromated Zinc Chloride* TREATED TIMBER can save you money

The initial cost of treated timber is approximately one and one half times that of untreated timber, but over a fifteen year period you save the expense of 5 to 9 complete renewals *plus* labor costs of removals and installations.

It also assures many important safety factors. The absence of decay prolongs good spike gripping power, eliminating the principal cause of rail spreading and subsequent derailments. Chromated Zinc Chloride treated ties and timber are also fire-resisting, clean and odorless.

Write for our information bulletin, "Wood Preservation for Mines."

DU PONT

E. I. DU PONT DE NEMOURS & COMPANY, INC.
GRASSELLI CHEMICALS DEPARTMENT
WILMINGTON — DELAWARE

HAZARD

ELECTRIC SHOVEL CABLE

Hazacord 3 conductor electric shovel cables are *tough*. Their general rugged strength and durable tear—and wear—proof jackets give them a *toughness* that stands up to any job. The jacket has a tensile strength of 2 tons per square inch and is resistant to all weather.

This is the result of painstaking research, the use of several chemical ingredients (which were comparatively unknown to cable makers a few years ago) and improved methods of processing.

For long satisfying service where the going is *toughest*, use Hazacord.

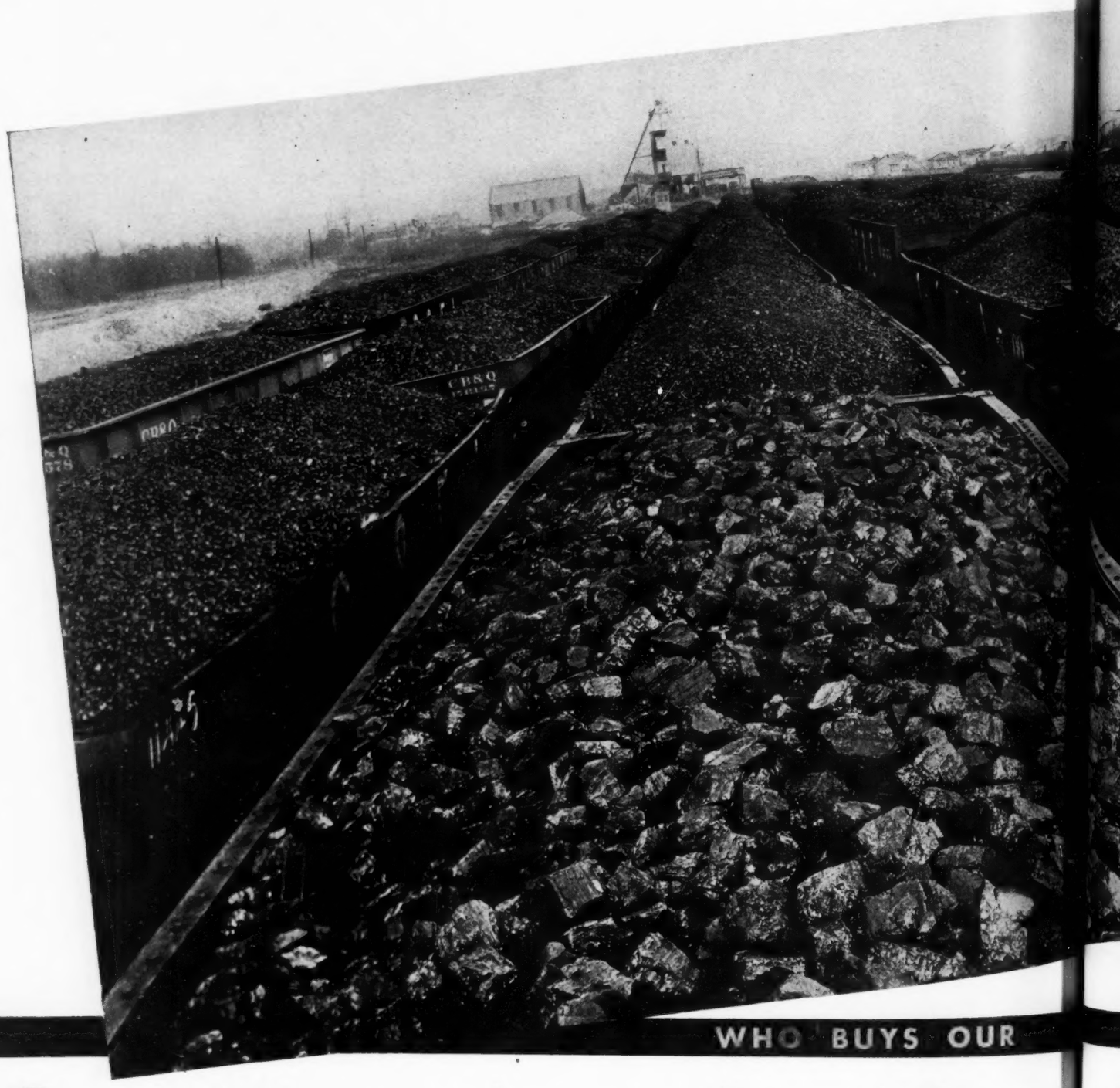
HAZARD INSULATED WIRE WORKS

DIVISION OF THE OKONITE CO.

WORKS: WILKES-BARRE, PENNSYLVANIA

New York Chicago Philadelphia Atlanta Pittsburgh Buffalo Boston Detroit
Seattle Dallas Washington San Francisco St. Louis Los Angeles

" . . . . . THAT'S MIGHTY



WHO BUYS OUR

Bunkerage & Foreign Ships 1,622,000 tons

Used at the Mines 5,932,000 tons

Exports 12,333,000 tons

Utilities 43,977,000 tons

Bee Hive & By-Product Coke 65,942,000 tons

GOOD COAL, *But* WHO'S GOING TO BUY IT?"

NOT WITHIN THE MEMORY of any living coal man has the answer to this question been more problematical than it is today.

"Coal is coal," your buyer says. "And *why* should we buy from you?" he adds.

That's just it. Why? Why should he buy *your* coal? Price? Quality? Suitability? Service? Or, what? Only *you* can answer this question; and you must answer it if you expect to sell your coal.

To put it another way. Would your prospective customers buy from you if they knew as much about your coal as you do? Then why not tell them about it? And about your facilities for serving customers?

Most of the coal sold in this country is purchased by a relatively small group of so-called "steam coal" buyers and a somewhat larger group of coal, or fuel, dealers. They are professional buyers. They want *facts* . . . and, what is even more important, they want to *compare* values.

That is why these coal buyers depend on the Keystone "Bluebook" for up-to-date and authentic information on possible sources of supply . . . in short, where to buy their coal.

The "Bluebook" is the one recognized authority for facts about all the mines and their location; coal trade names; classifications and compositions of all the various coals; names and addresses of coal sales agencies and every other important fact necessary to buy coal intelligently. In addition, it contains, among its many features, valuable information on how to burn coal; how to handle coal; how best to store coal. And it contains data on coal burning equipment with its many related accessories.

What better opportunity could be found for telling these buyers *your* story? Make certain the facts about what *you* have to offer are in front of these buyers when they are looking for them. The cost is surprisingly low.

Coverage of your principal customers and prospects guaranteed.

KEYSTONE COAL BUYERS MANUAL

The National Authority Since 1918—21 Years

McGraw-Hill Publishing Company, Inc., 330 West 42nd St., New York City

COAL

Class I Railroads 82,716,000 tons

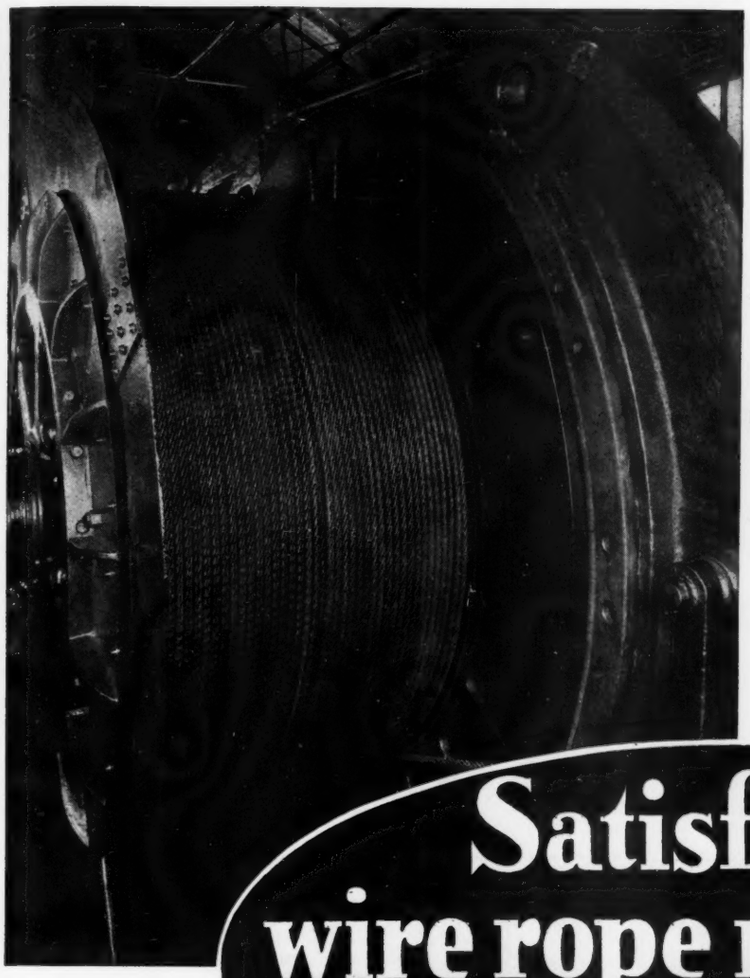
Domestic 122,045,000 tons

Other Industries 153,464,000 tons

Clip this and send it to your sales manager. Or send it to us for the facts and proof.

MEMO TO SALES DEPT.

Let's look into this. Sounds like a perfect place for our advertising. Don't you agree?



Satisfy your wire rope needs with *Precisionbilt* Ropes

Other J & L Steel Products:

Standard Pipe in seamless and welded—Seamless Steel Boiler Tubes—Hot Rolled Shapes—Abrasion Resisting Plates—Bar mill products including Bars for Concrete Reinforcement—Bar size shapes—Track Spikes—Wire Nails and Spikes—Galvanized Sheets Steel Roofing and Siding—Woven Wire Fencing—Barbed Wire—Soft Annealed Wire.

The true value of a Wire Rope is naturally based upon the service it renders, per dollar—the stamina—length of life and its general performance—and to get the best results you must get perfection in manufacture—as near as possible.

And to accomplish perfection in Wire Rope manufacture we have the very latest engineering achievement in machinery plus the skill that comes from long experience.

This is what we offer in Gilmore Precisionbilt Ropes. Every operation from mines to the finished product is supervised by men of long experience in Wire Rope manufacture plus the metallurgical supervision of men who know how to produce the finest steel.

We have found that the principal mining Ropes should be precisionbilt to meet every exacting requirement, to give longer and most economical service, since the cost is no greater than for Standard Ropes. Our engineering and metallurgical experts will gladly consult with you fully on this point and quote our prices.

GILMORE WIRE ROPE DIVISION

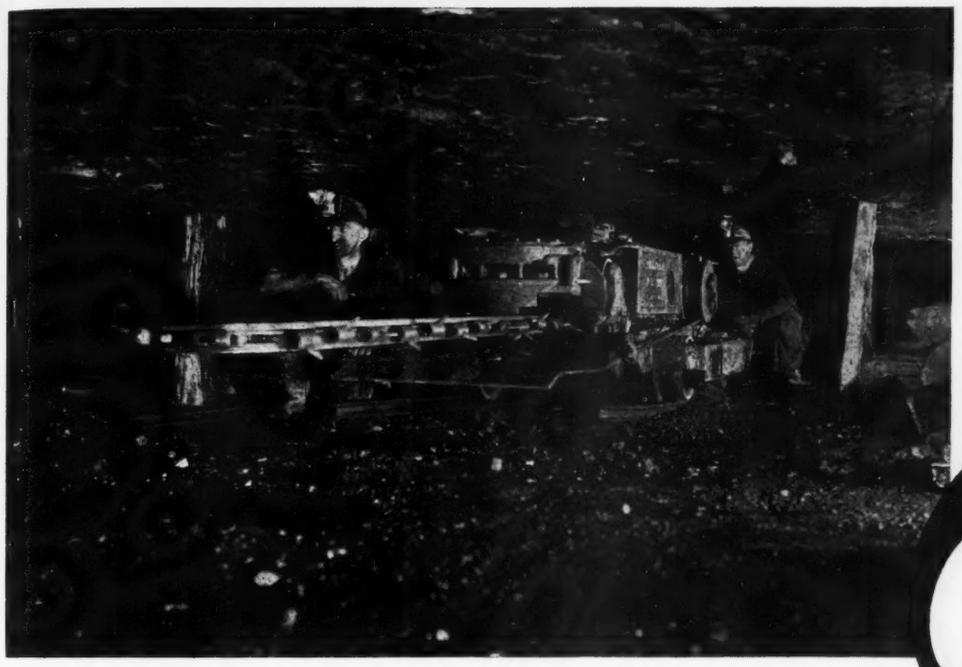
MUNCY · PENNSYLVANIA

JONES & LAUGHLIN STEEL CORPORATION

J&L STEEL

PITTSBURGH · PENNSYLVANIA

THE FASTEST MOST POWERFUL



THIN
SEAM
SHORTWALL

SULLIVAN
6-B
"MASTER"

COMPLETELY NEW —— NOT REBUILT

To meet the capacity of modern loading machines, Sullivan designed the new 6-B "MASTER" for thin seams: *This machine cuts faster and travels faster than any previous type of low vein cutter.* It is not a "made over" cutter, but *new* from stem to stern. It is complete with new labor saving features which are helping to set new records on shortwall cutting. It is equipped with a more powerful motor—ball and roller bearings throughout and splash lubrication. These are the features which help to deliver from 35% to 45% more power to the cutter than has ever been available in a shortwall mining machine.

The Sullivan 6-B will cut up to 42 inches per minute—handling speed 32 feet per minute—tramming speeds from 32 feet to 380 feet per minute.

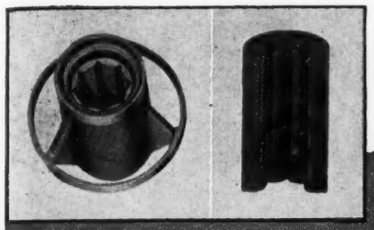
For complete details, ask your nearest Sullivan representative about the "MASTER" 6-B.

SULLIVAN MACHINERY CO. CLAREMONT, N. H.

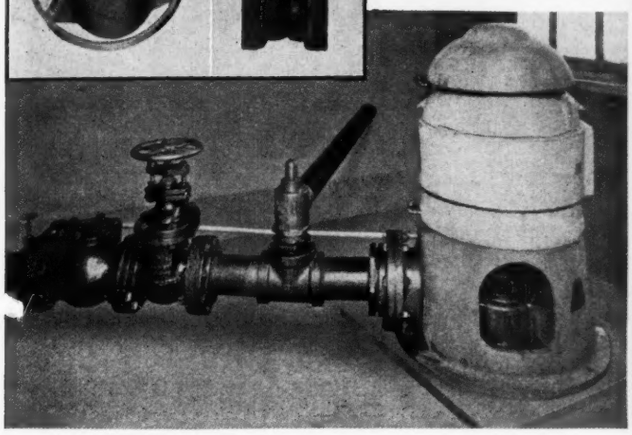
BRIEF SPECIFICATIONS

Overall length, less bar	7 ft. 8 in.
Overall height	16 in.
Overall width	40 in.
Length of cutter bar	5 to 8 ft.
Thickness of kerf	4, 5 or 6 in.
Weight, less cable	6,500 lbs.
Size of motor	50 H.P.

PROFESSIONAL SERVICES



Cutless rubber bearings used in drive shaft below pump head in Deming Turbine Pumps.



7 YEARS' TEST

PROVES EFFICIENCY OF CUTLESS RUBBER BEARINGS IN DEMING DEEP WELL TURBINE PUMPS...

"Recently," writes the owner of a Deming Deep Well Turbine Pump, "we made our first general overhauling of the pump purchased from you in 1931. This pump was in practically continuous operation for seven years and handled considerable sand with the water.

"Our examination of the cutless rubber bearings leads us to believe that they are good for many more years of service. We believe this to be a good test as to the merits of this type of bearing."

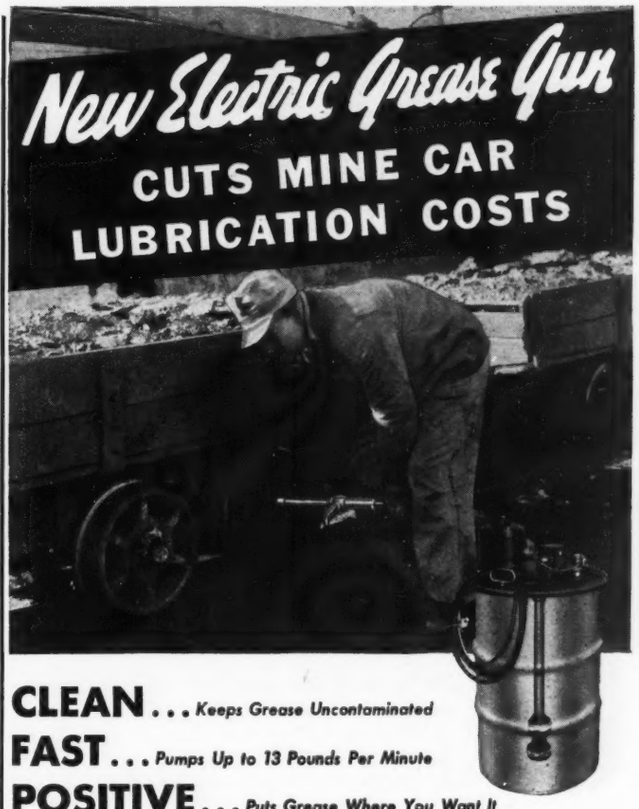
• • • • •

Deming *Water Lubricated* Deep Well Turbine Pumps are particularly well suited for service in dewatering mines and for general water supply. Write for FREE illustrated bulletin which gives complete information including specifications and performance tables of Deming Deep Well Turbine Pumps.

DEMING

PUMPS AND WATER SYSTEMS

THE DEMING COMPANY • SALEM, OHIO



CLEAN... *Keeps Grease Uncontaminated*

FAST... *Pumps Up to 13 Pounds Per Minute*

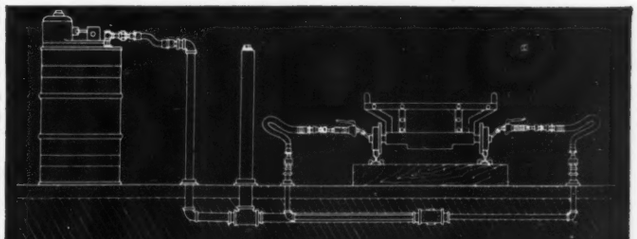
POSITIVE... *Puts Grease Where You Want It*

No more messing around with slow, wasteful, old-fashioned methods of mine-car greasing! This amazing new Alemite Electric Grease Gun pumps grease direct from original drum, handling any fluid or semi-solid lubricant which seeks its own level at a pressure of 300 lbs. per sq. in.

Built for heavy duty mine service, to stand up under severe use, this new Alemite Gun is fast—pumps at a rate of up to 13 pounds of lubricant per minute, serving one or two outlets. It's available for any current, voltage, and cycle, as specified by the customer.

Don't risk mine car bearings by continuing to use lubricant that's full of coal dust and grit! Let the new Alemite Electric Grease Gun do the work faster, with clean lubricant, and plenty of pressure. Mail coupon for complete details.

ALEMITE
A Division of Stewart-Warner Corp.
1838 Diversey Parkway, Chicago, Ill.
Stewart-Warner-Alemite Corporation of Canada, Ltd., Belleville, Ontario



TYPICAL INSTALLATION WITH TWO OUTLETS

ALEMITE

REG. U. S. PAT. OFF.

WORLD'S LARGEST MANUFACTURER OF LUBRICATION PRODUCTS

ALEMITE—*A Division of Stewart-Warner Corporation*
1838 Diversey Parkway, Chicago, Ill.
Please send your new booklet, "The Modern Way to Lubricate Mine Cars." Dept. B

Name .....
Address .....
City ..... *State* .....
Firm Name .....

SEARCHLIGHT SECTION

EMPLOYMENT : BUSINESS : OPPORTUNITIES : EQUIPMENT—USED or RESALE

UNDISPLAYED—RATE PER WORD:

Positions Wanted (full or part-time salaried employment only) 5 cents a word, minimum $1.00 an insertion, payable in advance.
(See ¶ on Box Numbers)

Positions Vacant and all other classifications, 10 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

INFORMATION

Box Numbers in care of our New York, Chicago or San Francisco offices count 10 words additional in undisplayed ads. Replies forwarded without extra charge.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

The advertising rate is $5.50 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

An advertising inch is measured ⅞" vertically on one column, 3 columns—30 inches—to a page.

COPY FOR NEW ADVERTISEMENTS RECEIVED UNTIL 17TH OF THE MONTH FOR THE ISSUE OUT THE FOLLOWING MONTH C.A.

POSITION WANTED

MINING ENGINEER desires position with responsible firm, can assume full charge of department, 22 years experience, Bituminous Anthracite fields. Hold Bituminous Anthracite Foreman Certificates, salary commensurate with results obtained. Married, age 41. Sober, industrious. References. PW-495, Coal Age, 330 W. 42nd St., New York, N. Y.

FOR SALE

JOY 5BU LOADER, completely rebuilt. Green River Mine, South Carrolton, Ky.

WANTED

ANYTHING within reason that is wanted in the field served by Coal Age can be quickly located through bringing it to the attention of thousands of men whose interest is assured because this is the business paper they read.

COAL LAND
FOR SALE OR LEASE

325 acres in fee in James River coal field, Powhatan County, Virginia, 20 miles west of Richmond. Said to be underlaid with coal.

North Carolina Joint Stock Land Bank
Durham, North Carolina

FOR SALE
LOCAL MINE

Ideal Location—Little Competition—Best Quality Coal—5½' Vein—Third Year Operation—200 Ton Present Capacity—500 Ton Possible—Terms—Reasonable.
BO-497, Coal Age
520 No. Michigan Ave., Chicago, Ill.

FOR SALE AT SACRIFICE
Electrically Equipped Coal Mine

containing 100,000 tons medium structure low volatile and 700,000 tons hard structure coal. Excellent class miners living in company owned houses. Modern screens. Ideal domestic operation, shipment over B&O R.R.
FS-493, Coal Age
330 West 42nd St., New York City

RAILS—CARS

All sections of rails and good serviceable second-hand cars, all gauges, also spikes, bolts, frogs, switches and ties.

M. K. FRANK
480 Lexington Ave., New York City — 450 Fourth Ave., Pittsburgh, Pa.

MINE HOISTS

1—Lidgerwood 14" diameter complete with 52 HP electrical equipment.
1—Diamond Band Friction 18" diameter with 50 HP electrical equipment.
1—Flory 30" diameter complete with 60 HP electrical equipment.
1—Vulcan Two Drum Band Friction Haulage Hoist 42" drums 2500' ⅞" dia. rope. 100 HP. 3 Ph. 60 Cycle Electrical Equipment.
1—Vulcan Shaft Hoist Single drum 72" drum 150 HP. 2200 Volt Electrical Equipment.
1—Vulcan Cylindro-Conical Shaft Hoist 400 HP. 2200 Volt complete with safety devices.
And other hoists to suit all mining conditions.

JONES MINING EQUIPMENT CO.
541 Wood St. Pittsburgh, Pa.

"LIQUIDATING"
Property of a Large Western Penna. Mine to be closed down 12/31/38—
"Coal Mined Out"

Complete Tipple 1500 TPH Screens—2 Loading Booms, Belt Conveyors, etc.

SUBSTATION
1—500 K.W. 275 V Ridgway Syn. Motor Generator Set
1—200 K.W. 275 V Ridgway Syn. Motor Generator Set

LOCOMOTIVES
4—3 ton Jeffrey "Gathering"
2—5 ton Jeffrey
3—5 ton Westinghouse "Gathering"
1—8 ton Westinghouse Haulage
2—10 ton Goodman Haulage
1—12 ton Jeffrey Haulage
1—13 ton Jeffrey Haulage

MACHINES
2—Goodman standard 35 HP Permissible
2—Goodman standard 35 HP Universal

Machine Shop—Car Shop
Blacksmith Shop
Pumps—Hoists—Motors
Particulars on Request
Wire—Phone—Write

JOHN D. CRAWBUCK CO.
Engineers—Appraisers
406 EMPIRE BLDG. PITTSBURGH, PA.

135 KW 250 v. G.E. dc 200 HP Diesel Eng.
300 KW Westgh MG set 550 v. 2300/3/60 .8PF
200 KW Westgh Ped. Rotary 275 v. 1200 rpm.
200 KW Ridgway 275 v. 2300/3/60 MG set
150 KW G.E. 275 v. 2300/3/60 .8PF.
100 KW G.E. 250 v. 2300/3/600 .8PF 1200 rpm.
100 KW Westgh. Rotary Ped. 250 v. 1200 rpm.
300 KW G.E. ATB, 2300/3/60/200 rpm dir. con. to a 23"x24" Skinner Universal Uniflow engine.
10 Ton 42" ga. com. Bat. & Trolley Loco.
13 Ton Bald. Westgh. 250 v. 36" ga. 908 motors.
10 Ton G.E. 250 v. 42" ga. B.B. motors. HM 809 Motors, O. S. Armor Plate Frame.
6 Ton Jeffrey 250 v. 36/42" ga. MH88 motors, with cable reel or crab.
5 Ton Westgh. Battery Loco. 42 or 44" ga.
35B Jeffrey 220/440 v. 42" ga. 6' cutter A.C.
CEY Sullivan Shortwall 250 v. D.C.
12DA Goodman 6' bar, std. truck, 42" ga.
113DA Goodman Universal 250 v. 36" ga. 6' bar.
112G3 Goodman Universal 220/440 volt, 42" ga.
500 HP G.E. slip ring 2300/3/60/450 rpm.
700 HP G.E. same as above at 393 rpm.

MOORHEAD-REITMEYER CO., Inc.
Columbia Bldg. Pittsburgh, Pa.

MINE EQUIPMENT

Locomotives—Mining Machines—Pumps—Motors—Transformers—Steel Tipples—Rescreeners — Steam Hoists — Electric Hoists — Compressors — Loading Booms—Engines — Generators — Scales — Miscellaneous Mine Equipment.
My own modern machine shop is available to repair and modernize your equipment.
C. EDWIN HAIR
Office & Warehouse *Mine Equipment and Supplies*
209-211 West Reed Street BENTON, ILLINOIS

MINE EQUIPMENT

Locomotives
Mining Machines
Rotary Converters & M.G. Sets
Hoist, Large or Small

Good Equipment at Attractive Prices

The INDUSTRIAL EQUIPMENT CORP.
P.O. Box 1647, Pittsburgh, Pa. — Warehouse Carnegie, Pa.

LOCOMOTIVES

20-Ton WESTGHE 550 V. 909 Mts. 44"-36" Ga.
15-Ton WESTGHE 250 V. 909-C Mts. 48"-36" Ga.
15-Ton JEFFREY 250 V. MH-110 Mts. 44"-36" Ga.
13-Ton JEFFREY 250 V. MH-110 Mts. 44"-36" Ga.
10-Ton JEFFREY 250 V. MH-110 Mts. 44"-36" Ga.
10-Ton GOODMAN 250 V. 29-A Mts. 36" Ga.
8-Ton JEFFREY 250 V. MH-100 Mts. 48"-36" Ga.
8-Ton JEFFREY 500 V. MH-100 Mts. 48"-36" Ga.
8-Ton JEFFREY 250 V. MH-85 Mts. 36"-24" Ga.
8-Ton WESTGHE 250 V. 906-C MTS. 48"-36" Ga.
6-Ton WESTGHE 250 V. 904-C Mts. 48"-42" Ga.

SUB-STATIONS

300 KW G.E. Syn. M.G. Set, 275 V. Gen., 2300/4000 V. Mt., .8 P.F., 1200 RPM. Control.
300 KW G.E. Syn. Converter, 275 V., 1200 RPM 2300/4000 V. Transformers. Control.
200 KW G.E. Syn. M.G. Sets, (2) 1—275 & 1—575 V. Gens. 2300/4000 V. Mts. .8 P.F., 1200 RPM. Complete Manual Control.
200 KW G.E. Syn. Converter, 275 V., 1200 RPM, 2300/4000 V. Transformers. Control.
150 KW G.E. Syn. M.G. Set, 275 V., Gen., 2300/4000 V. Mt., .8 P.F., 1200 RPM. Control.
100 KW G.E. Syn. M.G. Set, 275 V., Gen., 2300 V. Mt., .8 P.F. 1200 RPM. Control.

(Each unit listed above is owned by us and is only a small part of our large stock)

WALLACE E. KIRK COMPANY
Incorporated
Grant Building Pittsburgh, Pa.

MINE RAILS

Guaranteed Practically Equal to New, Super Quality Machine Reconditioned—not ordinary Relayers.

Standard Modern Section and Drilling
6,000 ton—20 lb. to 40 lb.
10,000 ton—45 lb. to 130 lb.

Priced at $200 to $500 per carload less than cost of New Rails. Less carload—in proportion.

Fully Guaranteed—shipped anywhere—subject inspection and approval at your Mine.

NEW RAILS, FROGS & SWITCHES, SPLICE BARS, TIE PLATES, BOLTS, NUTS, SPIKES, GAUGE RODS, OTHER ACCESSORIES

Shipment from stock. Phone, write, or wire for quotation.

L. B. FOSTER CO.
PITTSBURGH - CHICAGO - NEW YORK

ELECTRIC LOCOMOTIVES

1—13 ton Jeffrey, 250 volt with MH-110 motors
1—10 ton Jeffrey, 250 volt with MH-110 motors
1— 8 ton Jeffrey with MH-100 motors
3— 6 ton Jeffrey with MH-88 motors

SHORTWALL MACHINES

1—212-AA Goodman Low Vein, 250 volt
3—35-B Jeffrey, 250 volts DC
1—35-B Jeffrey AC

MOTOR GENERATOR SETS

1—300 KW G.E. Synchronous, 250 volt
2—150 KW G.E. Synchronous, 250 volt

WHEEL PRESS

1—200 ton Schaffer Horizontal Wheel Press

TIPPINS MACHINERY CO.
436 Seventh Ave. Pittsburgh, Pa

250 VOLT LOCOMOTIVES

3—13-ton Goodman 36-B motors, 36- to 44" ga.
4—15-ton Goodman 36-A motors, 36" to 44" ga.
3—13-ton Jeffrey MH-110 motors, 36" to 44" ga.
5—10-ton Jeffrey MH-78 motors, 36" to 44" ga.
5—10-ton General Electric, HM-809 motors, 36" to 48" ga.
6—8-ton Goodman 32-A motors, 36" to 42" ga.
5—6-ton General Electric, HM-823, 42" to 48" ga.
8—6-ton Jeffrey, MH-88 motors, 42" to 48" ga.
3—4-ton Jeffrey, MH-96, 42" to 48" ga.

DC MINING MACHINES

15—Goodman Standard and Universal Shortwall Mining Machines on self-propelled trucks and cable reel.

AC MINING MACHINES

7—Low vein and standard 12-G3 AC Shortwall Mining Machines, 220/440 volt AC on self-propelled trucks and cable reel.

ROTARY CONVERTERS

4—150 KW Westinghouse Rotary Converters, 250/275 volt DC, 2300/4000 volt AC Transformers and necessary appurtenances.

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10—Jeffrey Gathering Reels for 6-ton MH-88 Locomotives
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2—Safety Appliances Company Rock Dusting Machines
1—Complete switchboard and necessary instruments for a 300 KW Motor Generator Set.

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35BB Jeffrey 250 V. DC
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35B Jeffrey 220/440 AC
CE-7 Sullivan 220/440 AC
CE-7 Sullivan 250 V. DC

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4 ton Goodman 250 V. DC
5 ton West. 60 motors 250 V. DC
5 ton G.E. 250 V. DC
1—6 ton Milwaukee Gasoline
6 ton West. 904 motors 250 V.
10 ton Milwaukee Gasoline
20 ton West. 909 motors

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1500 KW. 275 V. 2300/4000/3/60 MG
1000 KW. 275 V. 2300/4000/3/60 MG
300 R. 275 V. 2300/4000/3/60 MG
200 KW. W. 275 V. 2300/3/60 Rotary
200 KW. G.E. 250 V. 2300/3/60 MG
200 KW. R. 250 V. 2300/3/60 MG
150 KW. W. 250 V. 2300/3/60 MG
150 KW. G.E. 250 V. 220/440/3/60 MG
150 KW. W. 250 V. 2300/4000/3/60 Rotary
100 KW. W. 250 V. 2300/3/60 Rotary
100 KW. G.E. 250 V. 2300/4000 AC MG

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300 KW. G.E. 3/60 SK. Uniflow Eng. Set.
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60 KW. 250 V. Buckeye Diesel Eng. Set.
1—50 KW. 125 V. Gas Eng. Set.

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1— 35 HP. Emerson single drum
3— 15 HP. Lidgerwood single drum

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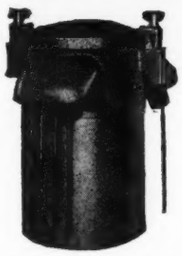

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All of the above are Underwriters Explosion Proof type meeting Bureau of Mines Specifications.

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All of the above last three items are totally enclosed fan-cooled motors.

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3—75 KVA G.E. 11000/2300/4000Y
2—100 KVA G.E. 4000/115/230
5—100 KVA G.E. 4000/230/460
1—100 KVA WEM 4200/110/220
3—100 KVA WEM 2400/240/480
1—100 KVA WEM 2300/230/460
2—75 KVA WEM 2300/230/460
1—50 KVA WEM 4000/115/230
3—50 KVA Pittsburgh 2300/115/230
3—50 KVA G.E. 13200/6600/115/230/460
3—37½ KVA Pittsburgh 2300/230/460
2—37½ KVA WEM 2300/230/460
1—50 KVA G.E. 2300/115/230
1—50 KVA WEM 2300/115/230
2—15 KVA Pittsburgh 2300/115/230
1—10 KVA G.E. 2300/230/460
1—3 KVA Maloney 4150/120/240
1—15 KVA WEM 4000/115/230
2—5 KVA WEM 2300/230/460
1—5 KVA WEM 2300/115/230
1—25 KVA G.E. 2300/115/230
1—7½ KVA Pittsburgh 4600/115/230
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2— 404 HP **Springfield**, 225#
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